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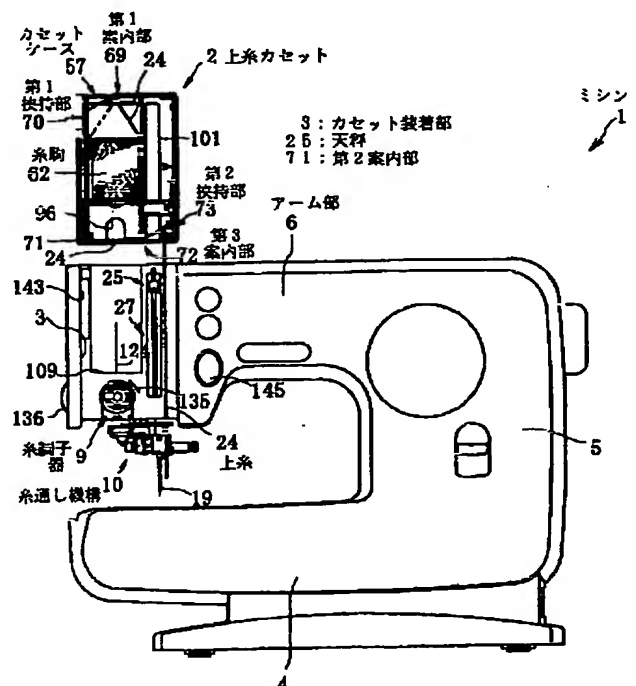
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(54) 【発明の名称】 ミシン

(57) 【要約】

【課題】 針の針穴に上糸を糸通しする自動糸通し機構は手動操作式のレバーを操作して作動させる構成であるため、その他の機構と連動して糸通しするのに適しておらず、上糸カセットの装着時に天秤の糸掛け部や糸調子器への糸掛けと連動して糸通しすることはできない。

【解決手段】 ミシンのアーム頭部に天秤移動領域を含むカセット装着部3を縦溝状に形成し、このカセット装着部3に糸駒62を縦向きに収容した上糸カセット2を着脱可能に構成し、アーム頭部に糸通し機構10を設け、上糸カセット2の装着動作に連動させて天秤25の糸掛け部と糸調子器9に糸掛けするとともに、糸通し機構10により針穴19aに糸通しする。



【特許請求の範囲】

【請求項1】 針の運動に調時して往復運動することにより糸駒から繰り出された上糸を取り上げる天秤と、針穴に上糸を通す自動糸通し機構とを備えたマシンにおいて、

マシンのアーム部に少なくとも所定範囲内で移動可能な可動操作体を設け、

前記可動操作体を前記所定範囲内で移動させることにより、上糸を操作して天秤の糸掛け部にセットすると共に、前記自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したことを特徴とするマシン。

【請求項2】 前記可動操作体は、上糸を天秤の糸掛け部に糸掛けする際にその上糸を操作する上糸操作部と、上糸を針穴に糸通しする際に前記自動糸通し機構を作動させる糸通し作動部を備えたことを特徴とする請求項1に記載のマシン。

【請求項3】 前記マシンのアーム部の前部又は前面部に、前記可動操作体を着脱可能に装着する為の操作体装着部を形成したことを特徴とする請求項1又は2に記載のマシン。

【請求項4】 前記可動操作体は、糸駒を収容しかつその糸駒から繰り出された上糸を天秤側に供給する上糸カセットであることを特徴とする請求項1～3の何れかに記載のマシン。

【請求項5】 前記マシンのアーム部の前面部に、前記操作体装着部としてのカセット装着部であって、上糸カセットの装着側が開放され且つ上糸カセットの着脱時に上糸カセットを直線状に案内する溝状のカセット装着部を形成したことを特徴とする請求項4に記載のマシン。

【請求項6】 前記カセット装着部の一部に天秤の糸掛け部が上下動する天秤移動領域を設けると共に、カセット装着部の他の一部に突出する糸調子器を設け、前記上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を少なくとも天秤と糸調子器に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したことを特徴とする請求項5に記載のマシン。

【請求項7】 前記カセット装着部に突出するように糸調子皿と糸調子バネとを含む糸調子器を設け、前記上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を天秤の糸掛け部と糸調子皿と糸調子バネとに糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したことを特徴とする請求項6に記載のマシン。

【請求項8】 前記上糸カセットをカセット装着部に途中の位置まで装着した状態で自動糸通し機構に手動にて上糸を掛け、その後の上糸カセットの装着動作により自動糸通し機構を作動させるように構成したことを特徴とする請求項5～8の何れかに記載のマシン。

【請求項9】 前記可動操作体の作動を自動糸通し機構

に伝達する伝達機構は、針棒又は針棒に固定された係合片との係合により解除作動する係合機構が設けられていることを特徴とする請求項1～8の何れかに記載のマシン。

【請求項10】 少なくとも針棒の作動位置を検出する検出手段を有し、この検出手段の検出信号を受け、針棒が所定位置にある場合だけ、前記可動操作体を移動可能に構成したことを特徴とする請求項1～9の何れかに記載のマシン。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、アーム部に少なくとも所定範囲内で移動可能な可動操作体を備えたマシンに関するものである。

【0002】

【従来の技術】 通常のマシンにおいては、アーム部に主軸で駆動される天秤機構や針棒駆動機構が配設され、天秤はアーム頭部の縦スリットから部分的に突出し上下に往復駆動される。アーム部の上端側に糸駒装着部が設けられ、アーム部の前面側に糸調子器と糸調子バネが配設され、この糸調子器の付近に糸調子器の調節ダイヤルが設けられている。針棒はアーム頭部の下方へ突出して、この針棒の下端部に針が取付けられ、縫製対象の生地を押える押え足とこの押え足を支持する押え棒は、押え上げレバーにより生地を押える下降位置と上方へ退避させた退避位置とに切換え可能である。

【0003】縫製を停止して上糸の糸駒を交換する場合、押え足は退避位置にあり、糸調子器が開放状態になっている。その状態で糸駒を交換し、この糸駒から繰り出した上糸を複数の糸案内部を経て糸調子器に導き、開放状態の1対の糸調子皿の間と糸調子バネとに糸掛けし、天秤の糸掛け部に糸掛けし、その後針の針穴に上糸の端部を糸通しする。このように、上糸の糸駒を交換するには糸調子器、糸調子バネ、天秤の糸掛け部に糸掛けを行い、針穴に糸通しを行なう必要がある。

【0004】そこで、米国特許第3,749,039号公報には、上糸カセットをアーム部に着脱可能に構成し、糸掛けを簡単に行えるようにした技術が記載されている。このマシンのアーム部の左右方向ほぼ中央部にはカセット装着部が設けられ、このカセット装着部に上方から上糸カセットを着脱可能になっている。前記カセット装着部は、天秤機構の天秤が上下に往復移動する天秤移動空間の右側に形成され、天秤の先端側部分はカセット装着部の左端部に突入して上下に往復移動する。

【0005】前記上糸カセットは、正面視ほぼ台形をなすカセットケースを有し、このカセットケースはケース本体と開閉蓋からなる。カセットケース内の上部の糸駒収容部には糸駒がその軸心を水平にして収容され、この糸駒の上糸は右方へ所定長さほぼ水平に繰り出される。カセットケースの中央部の下部には糸調子器を突入させ

る為の第1切欠き部が形成され、カセットケースの左端部の下部には天秤を導入する為の第2切欠き部が形成されている。

【0006】糸駒から繰り出された上糸を案内する5つの糸案内が設けられている。第1糸案内はカセットの右端部の上部に設けられ、第2、第3糸案内は第1切欠き部を挟む位置に設けられ、第4、第5糸案内は第2切欠き部を挟む位置に設けられている。第1糸案内には、上糸カセットをカセット装着部に装着しない状態で上糸に抵抗を付与し且つカセット装着後には開放する第1抵抗付与部が設けられている。第5糸案内には、カセット未装着の状態で上糸に抵抗を付与し且つカセット装着後には開放する第2抵抗付与部が設けられている。この第2抵抗付与部では第1抵抗付与部よりも強い抵抗を付与するようになっている。

【0007】アーム部に設けたカセット装着部の左端部分には、上糸カセットを装着する際に上糸を案内して天秤の糸掛け部に案内する糸案内材が設けられている。この糸案内材は左右1対のアーム板とウェブとを一体形成したもので、1対のアーム板の後端には上糸を案内する案内面が形成され、これらアーム板には天秤の糸掛け部に対応するノッチ（切欠き部）が形成されている。また、上糸カセットとカセット装着部には、上糸カセットの装着時に糸調子器の1対の糸調子皿を開いた状態にし、上糸カセットの装着完了後に1対の糸調子皿を閉じるようにする機構も設けられている。

【0008】上糸カセットをカセット装着部に装着する場合には、最初に、手動操作で主軸を回転させて天秤を最下位置に移動させる。次に、上糸カセットを上方からカセット装着部に装着していくと、上糸が糸案内材で案内されつつ下降し、第2、第3糸案内の間の上糸が糸調子器と糸調子バネに自動的に糸掛けされ、第4、第5糸案内の間の上糸が糸案内材の案内面で案内されて天秤の糸掛け部に自動的に糸掛けされ、上糸カセットが装着完了状態になると、第1、第2抵抗付与部が開放状態になり、その後の縫製中には糸駒から上糸が繰り出される。

【0009】一方、特開昭55-81693号公報には、ミシンのカセット式通糸装置が提案されている。このカセット式通糸装置では、アーム部の天秤移動領域とその右側領域に設けたカセット装着部と、このカセット装着部を開閉するカバー体を設け、このカバー体上糸カセットを着脱する。カセット装着部には糸調子器と糸取りバネとが突出し、カセット装着部の左端部には天秤移動空間がある。

【0010】上糸カセットは、糸巻体収容部と、1対の脚部などを有し、糸巻体の中心から繰り出した上糸を1対の脚部の間に延ばして自由スパンを形成する。カバー体を前方へ90度回転させて開き、このカバー体上糸カセットをセットしてから、カバー体を閉じる。天秤を

最下位置にしてカバー体を閉じる閉動作の際、上糸カセットの自由スパンが糸調子器と糸取りバネに自動的に糸掛けされる。その後、天秤を上昇させると、天秤の糸掛け部に自動的に上糸が掛けられる。尚、前記カバー体を閉じた状態では、糸巻の軸心は水平方向且つ前後方向に向いている。

【0011】他方、例えば特開平5-293284号公報に示すように、ミシンのアーム頭部に自動糸通し機構を装備し、その操作レバーを所定距離下方へ移動させることで、針の針穴に上糸の糸端を糸通しするように構成したミシンも実用に供されている。但し、この自動糸通し機構は他の機構や装置と連動する構成ではない。

【0012】

【発明が解決しようとする課題】 前記米国特許公報に記載の上糸カセットを用い、この上糸カセットをカセット装着部に装着しながら、天秤の糸掛け部と糸調子器の1対の糸調子皿及び糸調子バネとに自動的に糸掛けすることができる。しかし、前記公報のミシンでは、自動糸通し機構を装備していないから、上糸カセットの装着と連動して、針穴に上糸の糸端を糸通しすることができない。そのため、天秤の糸掛け部と糸調子器に糸掛けした後、手動操作より針穴に上糸の糸端を糸通しする必要があり、上糸交換の作業能率を高めることが難しい。

【0013】しかも、前記公報のミシンでは、上糸カセットの装着の際、予めミシンの主軸を手動操作することで天秤を最下位置を切換えてから、上糸カセットをカセット装着部に装着するような構成となっているため、天秤を最下位置を切換える操作が煩わしく、作業能率を高めるににくい。

【0014】本発明の目的は、可動操作体の移動に連動して天秤の糸掛け部に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しすることのできるミシンを提供すること、上糸カセットの装着動作に連動して天秤の糸掛け部に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しすることのできるミシンを提供すること、上糸カセットの装着操作に連動して天秤の糸掛け部と糸調子器に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しすることのできるミシンを提供すること、などである。

【0015】

【課題を解決するための手段】 請求項1のミシンは、針の運動に調時して往復運動することにより糸駒から繰り出された上糸を取り上げる天秤と、針穴に上糸を通す自動糸通し機構とを備えたミシンにおいて、ミシンのアーム部に少なくとも所定範囲内で移動可能な可動操作体を設け、前記可動操作体を前記所定範囲内で移動させることにより、上糸を操作して天秤の糸掛け部にセットすると共に、前記自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したことを特徴とするものである。

【0016】可動操作体は、上糸の糸駒を収容した上糸カセットであってもよく、糸駒を収容していない操作具であって上糸カセットと同様に糸掛けする為の操作具であってもよく、或いは、アーム部に所定角度揺動可能に枢着された揺動レバーであって上糸カセットと同様に糸掛けする為の揺動レバーであってもよい。

【0017】可動操作体は、ミシンのアーム部に少なくとも所定範囲内で移動可能に設けられ、この可動操作体を前記所定範囲内で移動させることにより、上糸を天秤の糸掛け部にセットすると共に、自動糸通し機構を作動させて上糸を針穴に糸通しする。このように、可動操作体の移動の動作に連動させて、天秤の糸掛け部に糸掛けしつつ、上糸を針穴に糸通しすることができるため、天秤の糸掛け部への糸掛けと、針穴への糸通しが簡単化し、作業能率を高めることができる。

【0018】請求項2のミシンは、請求項1の発明において、前記可動操作体は、上糸を天秤の糸掛け部に糸掛けする際にその上糸を操作する上糸操作部と、上糸を針穴に糸通しする際に前記自動糸通し機構を作動させる糸通し作動部を備えたことを特徴とするものである。可動操作体を装着しながら、上糸を天秤の糸掛け部に糸掛けする際に可動操作体の上糸操作部が上糸を操作し、上糸を針穴に糸通しする際に可動操作体の糸通し作動部が自動糸通し機構を作動させる。

【0019】請求項3のミシンは、請求項1又は2のミシンにおいて、前記ミシンのアーム部の前部又は前面部に、前記可動操作体を着脱可能に装着する為の操作装着部を形成したことを特徴とするものである。前記操作体装着部がアーム部の前部又は前面部に形成されているため、可動操作体の着脱操作が行い易くなるうえ、アーム部の前面部に位置している天秤の糸掛け部や糸調子器に上糸を掛ける面でも有利である。

【0020】請求項4のミシンは、請求項1～3の何れかの発明において、前記可動操作体は、糸駒を収容しかつその糸駒から繰り出された上糸を天秤側に供給する上糸カセットであることを特徴とするものである。この上糸カセットは、前記アーム部に対して着脱可能なものであり、この上糸カセットには糸駒が収容され、糸駒からの上糸を天秤側へ供給するため、上糸カセットの装着側への操作により天秤の糸掛け部への糸掛けと針穴への糸通しを簡単に行うことができ、上糸カセットを介して上糸を交換できる。

【0021】請求項5のミシンは、請求項4の発明において、前記ミシンのアーム部の前面部に、前記操作体装着部としてのカセット装着部であって、上糸カセットの装着側が開放され且つ上糸カセットの着脱時に上糸カセットを直線状に案内する溝状のカセット装着部を形成したことを特徴とするものである。

【0022】操作装着部としてのカセット装着部が、上糸カセットの装着側が開放され且つ上糸カセットの着脱

時に上糸カセットを直線状に案内する溝状に形成されているため、上糸カセットを装着する際には、カセット装着に上糸カセットを装着側から装着して直線的に移動させるという簡単な操作で装着できるし、上糸カセットを取り外す際に直線的に移動させることで取り外すことができる。

【0023】請求項6のミシンは、請求項5の発明において、前記カセット装着部の一部に天秤の糸掛け部が上下動する天秤移動領域を設けると共に、カセット装着部の他の一部に突出する糸調子器を設け、前記上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を少なくとも天秤と糸調子器に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したことを特徴とするものである。上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を少なくとも天秤と糸調子器に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするため、天秤と糸調子器への糸掛けと、針穴への糸通しを簡単に能率的に行うことができる。

【0024】請求項7のミシンは、請求項6の発明において、前記カセット装着部に突出するように糸調子皿と糸調子バネとを含む糸調子器を設け、前記上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を天秤の糸掛け部と糸調子皿と糸調子バネとに糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したことを特徴とするものである。従って、糸カセット内の上糸を天秤の糸掛け部と糸調子皿と糸調子バネとに自動的に糸掛けでき、自動糸通し機構を介して上糸を針穴に自動的に糸通しすることができる。

【0025】請求項8のミシンは、請求項5～8の何れかの発明において、前記上糸カセットをカセット装着部に途中の位置まで装着した状態で自動糸通し機構に手動にて上糸を掛け、その後の上糸カセットの装着動作により自動糸通し機構を作動させるように構成したことを特徴とするものである。上糸カセットをカセット装着部に途中の位置まで装着すれば、上糸カセットから手を離し得る状態になるため、自動糸通し機構に手動にて上糸を掛け、その後の上糸カセットの装着動作により自動糸通し機構を作動させる。

【0026】請求項9のミシンは、請求項1～8の何れかの発明において、前記可動操作体の作動を自動糸通し機構に伝達する伝達機構は、針棒又は針棒に固定された係合片との係合により解除作動する係合機構が設けられていることを特徴とするものである。そのため、停止状態の針棒の高さ位置に合わせて係合機構を解除作動させることができるから、針棒の高さ位置に応じて針穴の高さ位置がずれていても、確実に糸通しを行ってから解除作動させることができる。

【0027】請求項10のミシンは、請求項1～9の何

れかの発明において、少なくとも針棒の作動位置を検出する検出手段を有し、この検出手段の検出信号を受け、針棒が所定位置にある場合だけ、前記可動操作体を移動可能に構成したことを特徴とするものである。針棒が所定位置にある場合には、針穴の高さ位置が一定の高さ位置にあるから、可動操作体を装着して自動糸通し機構を作動させて糸通しするのに適していることに鑑み、針棒が所定位置にある場合に可動操作体を操作体装着部に装着可能にしてある。

【0028】

【発明の実施の形態】 以下、本発明の実施の形態について図面を参照して説明する。この電子制御式ミシンは、アーム頭部のカセット装置部に糸駒を収容した上糸カセットを装着可能に構成し、その上糸カセット2を装着する際の装着動作と連動して、天秤の糸掛け部と糸調子器に糸掛けを行なうと共に針の針穴に糸通しを行うように構成したものである。

【0029】最初に、ミシン1の基本構造、糸通し機構10について順に説明し、その後上糸カセット2、カセット装着部3、天秤機構8、糸通しの為の伝達機構115、糸調子器9の為の連動機構134の順に説明する。尚、以下の説明は、ミシンを操作する者から視た前後左右を前後左右として説明する。

【0030】図1～図3に示すように、この電子制御式ミシン1は、ベッド部4と、ベッド部4の右端部に立設された脚柱部5と、脚柱部5の上端から左方に延びるアーム部6を有する。アーム部6には、針棒上下動機構7、カセット装着部3、天秤機構8、糸調子器9、自動糸通し機構10が設けられている。尚、カセット装着部3はアーム部6の頭部（アーム頭部）に設けられている。アーム部6内には、主軸11が1対の軸受12を介して回転可能に支持され、主軸11は図示外のミシンモータの駆動力で回転駆動される。

【0031】次に、針棒上下動機構7について説明するが、この機構は一般的な構造ものであるので簡単に説明する。図1、図3～図8に示すように、アーム部6のアーム頭部には、針棒台フレーム13が立向きに配設され、針棒台フレーム13は後壁部14と左壁部15とを有し、後壁部14の下端と上端には前方へ延びる下支持部14aと上支持部14bが夫々一体形成されている。左壁部15の上端部には、上支持部14bよりも上方に延びる枢支腕部15aが形成され、針棒18は上支持部14bと下支持部14aを上下動可能に挿通している。

【0032】枢支腕部15aの上端部には、左右方向向きの軸部材16aが固着され、前面開放状の平面視略コ字形状の枢支金具16が軸部材16aに固定的に連結され、枢支金具16は前後方向向きの水平な支持軸17を介してミシン機枠に揺動可能に支持され、針棒台フレーム13は支持軸17を揺動中心として左右方向（針振り方向）へ揺動可能である。尚、ステッピングモータによ

り針棒台フレーム13を介して針を揺動駆動する機構は一般的なものであるのでその説明は省略する。針棒18は上支持部14bと下支持部14aに上下動可能に支持され、針棒18の下端には針19が着脱可能に取付けられている。

【0033】図3、図11～図13に示すように、主軸11の左端側部分には、天秤機構8の天秤クランク20が設けられ、その天秤クランク20にクランクピン21を介して針棒クランク22が回転自在に連結されている。針棒18の略中段部には針棒抱き23が固定され、針棒クランク22が針棒抱き23に連結されている。縫製の際、ミシンモータにより主軸11が回転駆動され、針棒クランク22により針棒18が上下に往復駆動される。

【0034】図11～図15、図17に示すように、アーム部6には、針19の上下運動に調時して上糸24を取り上げる天秤25を備えた天秤機構8が設けられている。天秤25の先端部に上方から糸掛け可能な糸掛け部26が形成され、カセット装着部3の右端側部分の全高に互って、天秤25の糸掛け部26が上下に往復移動可能な天秤移動領域27が設けられている。カセット装着部3の下部に突出するように、上糸に通過抵抗を付与する為の糸調子器9が設けられている。

【0035】この糸調子器9は、押え足28を昇降させる押え上げレバー29により開閉操作可能であり、後述するように、上糸カセット2の装着時にも、糸調子器9が開閉操作される。尚、脚柱部5内にはほぼ立て向きの縦軸が配設され、その縦軸はギヤ機構を介して主軸11に連動連結され、この縦軸の駆動力がベッド部4内の糸捕捉用釜に伝達される。一般的な電子制御ミシンと同様に、針19と糸捕捉用釜とステッピングモータで駆動される布送り機構との協働により加工布30に縫製が施される。

【0036】次に、針19の針穴19aに上糸24を糸通しする自動糸通し機構10について、図5～図10、図14、図15、図17、図19を参照して説明する。針棒台フレーム13の上支持部14bと下支持部14aには、針棒18の左側に位置する糸通し軸31とスライダガイド軸32とが上下動可能に支持されている。糸通し軸31の上端部は、ブラケット16と軸部材16aの間の隙間に挿通しており、糸通し軸31の略中段部には、水平方向に突出する摺動ピン33が固着されている。

【0037】糸通し軸31の下端部には、合成樹脂製のフック保持部材34が固着され、フック保持部材34の上側と下側に対応する糸通し軸31に、側面視略コ字形状の第1糸案内部材35（図17参照）の上支持部、下支持部が回転可能に支持されている。この第1糸案内部材35のうち、上支持部と下支持部とを連結する鉛直状の連結壁36には、上糸24を係合して案内する糸ガイ

ド36aが切欠き状に形成されている。

【0038】図9(a)～(c)に示すように、フック保持部材34にはフック機構37が固定され、このフック機構37は、糸通しフック37aと、糸通しフック37aの両側に位置する2枚のガイド部材37bと、これら糸通しフック37aとガイド部材37bを水平に貫通する糸保持ワイヤ37cなどから構成されている。糸通しフック37aの先端部にはフック部が形成され、糸通しの際針穴19aにこのフック部が挿通し、針19が前記ガイド部材37bにより案内されつつ針穴19aの直前に位置する上糸24を引っ掛けるようになっている。

【0039】フック保持部材34には、第2糸案内部材38が一体的に固着され、この第2糸案内部材38の略先端近傍部が下方に屈曲形成され、その屈曲部が糸案内部38aとして機能している。糸案内部38aは、糸通し軸31に対しフック機構37と略反対側に位置し且つ所定距離だけ離隔している。即ち、この第2糸案内部材38とフック機構37とが一定の位置関係を保持して糸通し軸31に一体的に設けられている。

【0040】次に、糸通し軸31を所定角度だけ回転させる回転機構について説明する。図5～図8、図14、図15、図17、図19に示すように、針棒台フレーム13の背面側において糸通し軸31とスライダガイド軸32の上端部には、合成樹脂製の糸通しスライダ40が上下動可能に外嵌されている。即ち、糸通しスライダ40は、上枢支部41及び下枢支部42と、外周壁部43と、糸通しスライダ爪44とを有する。

【0041】上枢支部41及び下枢支部42は、糸通し軸31とスライダガイド軸32とにわたって設けられ、外周壁部43は、これら上枢支部41と下枢支部42とを鉛直状に連結し且つ糸通し軸31の前記上端部の外周の略半分を覆うように形成されている。この外周壁部43には螺旋状の糸通しスライダカム部43aが形成されている。上枢支部41と下枢支部42の左端部には、糸通しスライダ爪44が連結され、その左端略中段部に爪部44aが形成されている。

【0042】糸通し軸31の略中段部のうち、下枢支部42の直ぐ上側に対応する位置には、所定長さの摺動ピン33が貫通状に固定され、この摺動ピン33の奥側端部が糸通しスライダカム部43aに係合している。糸通し軸31のうち摺動ピン33よりも一定長さ下側には、バネ受けピン45が貫通状に固定され、糸通し軸31のうち下枢支部42とバネ受けピン45との間には、圧縮コイルバネ46が外装されている。スライダガイド軸32のうち下枢支部42と、針棒台フレーム13の下支持部14aとの間には、糸通しスライダ40を上方へ付勢する為の圧縮コイルバネ47が外装されている。

【0043】ここで、オフセット部材48について説明すると、図4～図8に示すように、糸通し軸31とスライダガイド軸32には、糸通しスライダ40の背面側

で且つ針棒台フレーム13の上支持部14b、下支持部14a間の高さの約3/4長さ範囲において、オフセット部材48が上下動可能に装着されている。このオフセット部材48は、上支持部49と、下支持部50と、これら上支持部49と下支持部50とを連結する鉛直状の連結壁51等から構成されている。上支持部49は、糸通し軸31とスライダガイド軸32とに挿通され、下支持部50は糸通し軸31のみに挿通されている。

【0044】針棒18の針棒抱き23の直ぐ上方には、係合片としての糸通し位置決め部材52が固定され、オフセット部材48の上支持部49の右端部分が、この糸通し位置決め部材52に上方から当接可能に構成されている。この上支持部49の右端部分が糸通し位置決め部材52に当接した状態で、糸通しフックが針19の針穴19aの高さ位置に合致するようになっている(図6参照)。連結壁51の左端下部には、オフセット部材カム部53が形成され、このオフセット部材カム部53は、下方に向かう程左側に突出する傾斜部53aと、この傾斜部53aの下端から鉛直下方に延びる平坦部53bであって、糸通しスライダ爪44の爪部44aよりもやや左方に突出する平坦部53bとを有する。

【0045】後述する上糸カセット2により糸通しスライダ40を、圧縮コイルバネ47の付勢力に抗して図5に示す上限位置から下方に押下げると、糸通し軸31とスライダガイド軸32とオフセット部材48が追従して下降し、オフセット部材48の上支持部49が糸通し位置決め部材52に当接した状態で停止する(図6参照)。このとき、糸通し軸31とスライダガイド軸32に対して糸通しスライダ40が相対的に下降するので、摺動ピン33が螺旋状の糸通しスライダカム部43aに沿って移動する。糸通し軸31が平面視にて時計回り方向に所定角度だけ回転して糸通しされる(図9(a)～(c)参照)。

【0046】この糸通しのとき、フック機構37が針19に接近する方向に回転され、前記糸通しフックが針穴19aに挿通する。同時に、第2糸案内部材38がフック機構37と同期して時計回り方向(針19から遠ざかる方向)に回転される。糸通しに際して、糸通し軸31の下端部に回転可能に支持された第1糸案内部材35を第2糸案内部材38から離隔する方向に回転させるリンク機構54も設けられている。即ち、糸通し軸31が糸通しの為に回転する前の待機状態のときには、第2糸案内部材35が前方向きの姿勢であり、第2糸案内部材38の糸案内部38aは、連結壁36の糸ガイド36aの直ぐ内側に位置している。

【0047】糸通し軸31が下限位置まで下降した後に回転するときには、フック機構37と第2糸案内部材38とが平面視にて時計回り方向に一体的に回転すると共に、リンク機構54を介して第1糸案内部材35が反時計回り方向に回転する。つまり、第1糸案内部材35

は、第2糸案内部材38から離隔移動し且つフック機構37に接近移動するようになっている。尚、リンク機構54付近部には、上糸24を微圧挾持する支持板55、糸案内皿56も設けられている。

【0048】次に、上糸カセット2について説明する。図1、図10、図14～図36に示すように、可動操作体としての上糸カセット2は、左右方向幅が小さな縦長の直方体に近い形状のカセットケース57と、糸駒62を収容する糸駒収容部57aと、糸駒収容部57a内に糸駒62を保持する糸駒保持部58と、糸駒保持部58に保持された糸駒62と、糸駒62から繰り出される上糸24を糸出口68まで案内する糸経路59と、天秤機構8の天秤25の糸掛け部26が上下に往復移動する領域である天秤移動領域57bと、糸調子器9を突入させる糸調子器収容部57c等を有する。尚、カセットケース57の底壁のうちの右端近傍部に糸出口68が形成されている。

【0049】カセットケース57は、合成樹脂製のカセット本体60と開閉蓋61とを有し、カセット本体60の右端部に開閉蓋61が開閉可能に連結されている。但し、開閉蓋61はカセット本体60に対して上下にスライドさせて開閉するように構成してもよい。糸駒62の上糸24の糸色を識別する糸色識別手段として、開閉蓋61は透明な材料で構成され、カセットケース57内の糸駒62の糸色を識別可能となっている。尚、別の糸色識別手段として、例えば、開閉蓋61に糸駒62を視る為の開口穴を形成してもよく、或いは、カセットケース57の表面の一部に糸駒62の上糸24の色と同色のシールを貼ってもよい。

【0050】図10、図16、図28～図33に示すように、天秤移動領域57bはカセットケース57内の右側の約1/3幅部分に形成され、糸駒収容部57aはカセットケース57内の左側の約2/3幅部分のうちの上部約2/3部分に形成され、糸調子器収容部57cはカセットケース57内の左側の約2/3幅部分のうちの下部約1/3部分に形成され、カセット本体60内の左端部には糸経路59の為の領域が仕切壁66、99で仕切られている。

【0051】天秤移動領域57bにおいてカセット本体60の後壁には天秤25の糸掛け部26と後述の糸案内部材106Aを突入させる為の縦長のスリット101が形成されている。糸調子器収容部57cにおいてカセット本体60の後壁と底壁には、糸調子器収容部57cに糸調子器9を導入する為の切欠き部96が形成されている。天秤移動領域57bと糸駒収容部57a及び糸調子器収容部57cの間には鉛直の仕切壁67、100が形成され、糸駒収容部57cと糸調子器収容部57aの間には開閉蓋61側へ突出する水平な支持壁63が形成されている。

【0052】糸駒保持部58は、糸駒62をその軸心を

鉛直向きに保持するように構成されているため、カセットケース57の左右方向の幅を小さくし、カセットケース57及びカセット装着部3の小型化を図ることができる。糸駒保持部58は、支持壁63（収容部の壁部に相当する）と糸駒保持軸64とで構成されている。この支持壁63には糸駒保持軸64が上方に突出するように設けられている。この糸駒保持軸64は、周方向に3つ割りに形成されて拡張方向に弾性変形可能であり、種々のサイズの軸穴を有する糸駒62を保持可能になっている。

【0053】支持壁63のうち、糸駒62の下端（軸心方向の一端）と当接する部分の前端部には、糸駒62を下方から押して糸駒保持軸64から上方へ取り外す為の凹部65が形成されている。この凹部65は、糸駒62の外周面よりも半径方向内側に窪んだ切欠き状に形成され、上糸24が弛んでも糸駒62と支持壁63の間に上糸24が入り込まないようにしている。

【0054】次に、糸経路59について説明する。図14、図15、図17～図21に示すように、糸経路59は、糸駒保持部58に保持した糸駒62からの繰り出し点79を基点とし、糸駒62から上方へ繰り出した上糸24をカセットケース57の糸出口68に導く上糸案内経路である。糸経路59は、第1案内内部69と、第1挟持部70と、第2案内内部71と、第3案内内部72と、第2挟持部73とを有する。糸駒62を糸駒保持部58に保持した状態で、糸駒62から上方へ繰り出された上糸24は、第1案内内部69、第1挟持部70、第2案内内部71、第3案内内部72、第2挟持部73を順に經由してカセットケース57の右端近傍の下端部の糸出口68に導かれる。

【0055】図17、図19、図22～図25に示すように、第1案内内部69と第1挟持部70は、糸経路59の上流側部分に設けられている。第1案内内部69は、カセットケース57の頂部に設けられている。第1案内内部69は、カセット本体60に形成されたピン支持部材74と、このピン支持部材74から前方へ突出し更に右方へ曲折した平面視L字状の案内ピン75と、開閉蓋61に形成された糸抜け防止用のリブ76等で構成されている。

【0056】案内ピン75は、前後方向に所定長さのある糸案内内部を有し、この糸案内内部を外部に臨ませるように、カセット本体60と開閉蓋61の頂部壁には、矩形切欠き状の開口部77、78が夫々対向状に形成され、外部の糸駒から供給される上糸を開口部77、78から第1案内内部69へ導入可能になっている。糸駒62から繰り出された上糸24は、案内ピン75の糸案内内部に前後方向に移動自在に掛けられ、これにより糸駒62と第1案内内部69間の距離があまり長くない場合でも、糸駒62から上糸24を円滑に引き出すことができる。

【0057】第1挟持部70について説明すると、図2

3、図24に示すように、第1挟持部70は、糸経路59の上流側部分において上糸24に通過抵抗を与えると共に上糸に糸よりによる糸の絡まり等が発生するのを防止する為のものであり、この第1挟持部70は、カセットケース57内の左端部の上端付近に設けられている。第1挟持部70は、糸案内内部80aを有する押え板80と、この押え板80に上糸24を押圧する板バネ81とを備えた糸より発生防止機構82からなる。

【0058】押え板80と板バネ81はカセット本体60の仕切壁66に固定されている。押え板80の糸案内内部80aは、上方開放の狭幅の切欠きであり、糸案内内部80aがカセット本体60よりも前方へ突出している。板バネ81は糸案内内部80aの左側面に当接して糸案内内部80aとの間に上糸24を挟持し、上糸24に通過抵抗を付与することにより上糸24に糸よりによる糸の絡まり等が発生するのを防止する。

【0059】次に、図14、図15、図17～図21、図26、図27に示すように、第2、第3案内部71、72と第2挟持部73は、糸経路59の下流側部分に設けられている。第2案内部71はカセットケース57内の左端部の下端部にあり、第3案内部72はカセットケース57内のうちの糸調子器収容部57cと天秤移動領域57bの境界部の下端部にあり、第2挟持部73はカセットケース57内の右端近傍の下端付近にある。

【0060】上糸24は、第1案内部69から第1挟持部70へ斜めに延び、この第1挟持部70から第2案内部71へ鉛直に延び、第2案内部71から第3案内部72へ水平に延び、第3案内部72から第2挟持部73へほぼ水平に或いは傾斜状に延びている。このように、上糸24は、カセットケース57の下端部に沿って横断する状態に導かれている。

【0061】第2案内部71は、カセット本体60の後壁部に設けたピン支持部83と、このピン支持部83に固定されて前方へ突出する案内ピン84と、開閉蓋61に形成された糸抜け防止用のリブ85などからなる。ピン支持部83とリブ85とで上糸24の前後方向位置が適切に設定される。第3案内部72は、カセット本体60の後壁部に設けたピン支持部86と、このピン支持部86に固定されて前方へ突出する案内ピン87と、開閉蓋61に形成された糸抜け防止用のリブ88などからなる。ピン支持部86とリブ88とで上糸24のの前後方向位置が適切に設定される。

【0062】次に、第2挟持部73について説明する。図14、図15、図17～図21、図33～図36に示すように、第2挟持部73は、糸出口68の付近において上糸24に通過抵抗を与えるものである。上糸カセット2をカセット装着部3に未装着の状態においても、装着完了しない状態においても、第2挟持部73は上糸24に第1挟持部70よりも強い通過抵抗を与えるように構成してある。そのため、上糸カセット2の装着時に上

糸24を天秤25の糸掛け部26と糸調子器9に糸掛けする際に、第2案内部71と第2挟持部73の間で、上糸24が緊張状態を維持するため、天秤25の糸掛け部26と糸調子器9に確実に糸掛けすることができるうえ、その糸掛けに際して必要な上糸24を糸駒62から、確実に上糸24を繰り出すことができる。つまり、第3案内部72と第2挟持部73とが、天秤25の糸掛け部26に糸掛けする際にその上糸24を操作する上糸操作部として機能とする。

【0063】第2挟持部73は、軸心を左右方向に水平に向けた可動の可動軸部材94と、上糸24を案内する案内ピン89と糸保持板90と板バネ部材91などで構成されている。可動軸部材94は、小径の軸部と、カセット本体60の下端部の右側面に対して出没自在の大径の操作ボタン94aとからなる。この可動軸部材94は、カセット本体60の右端近傍かつ下端近傍部の縦壁部92、93に左右方向へ水平移動可能に装着され、板バネ部材91で右方へ弾性付勢されている。

【0064】可動軸部材94の左端部には、案内ピン89の後端部が前後方向向きに貫通固着され、案内ピン89と縦壁部93の左側面の間には、案内ピン89との間に上糸24を保持する糸保持板90が固着され、可動軸部材94と共に右方へ付勢された案内ピン89と糸保持板90との間に上糸24を挟持することで、上糸24に通過抵抗を付与するようになっている。

【0065】図14、図18に示すように、上糸カセット2をカセット装着部3から取り外した状態においては、板バネ部材91の付勢力により、操作ボタン94aの先端部がカセット本体60の右側面から突出している。そのため、上糸カセット2をカセット装着部3に装着しない状態において、糸駒62から上糸24を繰り出す場合には、操作ボタン94aを指で押し込むことで、可動軸部材94と案内ピン89を左方へ移動させて第2挟持部73を開放状態にし、第1挟持部70の通過抵抗に抗して上糸24を繰り出すことができる。そして、後述のように、上糸カセット62をカセット装着部3に装着完了した状態では、上糸24に通過抵抗を与えないように第2挟持部73は開放状態となる。

【0066】図19、図20に示すように、上糸カセット2をカセット装着部3に装着完了した状態においても第2挟持部73を開放状態にする為に、カセット装着部3の右側壁に操作ボタン94aを逃す為の縦溝部95aと、上糸カセット2の装着完了状態において操作ボタン94aを退入状態にする上糸開放カム95が形成されている。これらについてはカセット装着部3の説明において後述する。

【0067】上糸カセット2をカセット装着部3に装着完了した状態では、第2挟持部73は開放状態となるが、上糸カセット57内の糸調子器収容部57cに突入する糸調子器9に上糸24が挟持されて通過抵抗を付与

されるため、第1挟持部70と糸調子器9との間の上糸24は緊張状態を維持する。そのため、糸経路59の糸調子器9よりも上流側の上糸24に糸よりによる糸の絡まり等が発生することはない。尚、前記糸調子器9をアーム部6に装備する代わりに、上糸カセット2内に糸調子器9を装備することも可能であり、この場合も前記同様に、第1挟持部70と糸調子器9間の上糸24が緊張状態を維持するため、糸よりによる糸の絡まり等が発生するのを防止できる。

【0068】前記のように、上糸24を第1挟持部70で挟持し、かつ糸調子器9の後記糸調子皿間で挟持して通過抵抗を与え、これら間でその上糸を緊張状態とした場合、糸調子器9の糸調子皿の入口部分で上糸が挟持されて抵抗が加わると、この部分において、その糸本来の構造上のよりがさらに締まる方向に強化されるので、前記第1挟持部70と糸調子器9の糸調子皿との間の上糸部分には、常に、糸本来の構造上のよりがさらに強化された糸よりが発生している。

【0069】この状態で、もしも、この間の上糸部分が弛んだ場合、この上糸部分のある所で折れ曲がって、この部分を中心として糸同士が直線状やだんご状に絡まる現象が生じる。このような絡まり部分が糸調子器9の糸調子皿に案内されると、その糸調子皿に引っ掛かって糸切れや糸の引きつり等が発生する。しかしながら、前記のように、上糸24を前記第1挟持部70と糸調子器9の糸調子皿とでそれぞれ挟持してこの間の上糸部分を緊張状態としておくことにより、前記のような絡まり現象が発生しない。尚、糸調子器9の糸調子皿を通過した上糸部分は、前記のように強化された糸よりが戻される。

【0070】次に、上糸カセット2をカセット装着部3に装着する際に、糸調子器9をカセットケース57内の糸調子器収容部57cに突入させる為の構成について説明する。図1、図14、図15、図23、図26、図30、図31に示すように、糸調子器収容部57cの下方において、カセット本体60と開閉蓋61の底壁には、矩形切欠き状の開口部97、98が夫々対向状に形成され、カセット本体60の後壁部には、開口部97に連なる部分長円形状の切欠き部96が形成されている。上糸カセット2の装着の際、切欠き部96と開口部97、98を通過して糸調子器9が糸調子器収容部57cに突入状に収容される。

【0071】図1、図3、図11～図15、図26、図27、図30、図31に示すように、天秤移動領域57bの下方において、カセット本体60と開閉蓋61の底壁には、矩形切欠き状の開口部102、103が夫々対向状に形成され、カセット本体60の後壁部には、開口部102に連なり且つ下端から上端近くまで延びる縦長のスリット101が形成され、上糸カセット2をカセット装着部3に装着する際に、これら開口部102、103とスリット101を通過して天秤25の糸掛け部26と糸案内部材106Aがカセ

ットケース57内へ突入状に導入される。

【0072】図21、図22、図24に示すように、カセット本体60の後壁のうちの糸駒収容部57aに面する後壁は、糸駒62の収容のために後方へ部分円筒状に膨出しており、その部分円筒部の下端に対応する部位には、カセット装着部3の後述の受止め部109に上方から係合して上糸カセット2の高さ位置を決定する係合部112が形成されている。カセット本体60の後壁の左右両端部には、カセット装着部3の後述のガイド溝110、111に夫々係合可能な突条的な係合部113、114が形成されている。上糸カセット2をカセット装着部3に装着した状態で、開閉蓋61の前面がアーム部6の前面と同一面となし、カセット本体60と開閉蓋61の上壁がアーム部6の上面と同一面をなすように形成されている（図19、図22参照）。

【0073】次に、上糸カセット2の糸止め部104について説明する。図25、図30、図35、図36に示すように、カセットケース57の外面部のうち、開閉蓋61の枢支部の面取り部105と、開閉蓋61を閉じた状態でこの面取り部105に接するカセット本体60との間に、上糸カセット2の外部へ延びた上糸24の糸端側部分を仮止めするように構成され、これら面取り部105とカセット本体60の一部とで糸止め部104が構成される。但し、糸止め部104Aとして、図35、図36に示すように、カセットケース57の外面部に、ケース側に付勢された板バネ片を設け、この板バネ片に上糸24の糸端部分を仮止めするように構成してもよい。

【0074】次に、上糸カセット2を上方から着脱自在に装着する為のカセット装着部3について説明する。図1、図2、図4、図21に示すように、操作体装着部としてのカセット装着部3は、ミシンのアーム部6の先端側部分（アーム頭部）の前面部に正面視にて縦長の長方形形状に且つほぼ左右に細長の長方形断面溝状に形成されている。カセット装着部3の右端側部分には、天秤25の糸掛け部26が往復移動する上下に細長い天秤移動領域27が設けられ、この天秤移動領域27を除くカセット装着部3の大部分は天秤移動領域27の左側に位置している。

【0075】糸駒保持部58に保持した糸駒62の軸心を天秤25の糸掛け部26の往復移動方向とほぼ平行にして、鉛直方向上方から上糸カセット2を装着したり、鉛直上方へ上糸カセット2を取り外したりできるようにカセット装着部3の上端と下端は開放状に形成されている。カセット装着部3の中央よりもやや左側部位の下端付近には、糸調子器9がその軸心を前後方向向きにして前方へ突出する状態に設けられている。カセット装着部3の後壁の下部には、上糸カセット2の係合部112を受け止めて、上糸カセット57を所定の高さ位置に位置決めする段状の受止め部109が形成されている。カセット装着部3の左側壁と右側壁の後端付近には、上糸カセ

ト2の係合部113,114 を夫々摺動自在に導入して案内するガイド溝110,111 が夫々形成されている。

【0076】次に、第2挟持部73を開放状態に切換える為にカセット装着部3に設けた上糸開放カム95について説明する。図18、図20に示すように、カセット装着部3の右側壁の後部には、前記の縦溝部95aとその終端側に位置する上糸開放カム95が形成されている。縦溝部95aはカセット装着部3の上端から下端付近部まで連続しており、上糸開放カム95は縦溝部95aの下端にテーパ部95bを介して連続し縦溝部95aよりも左側へ突出している。

【0077】従って、図17、図18に示すように、上糸カセット2をカセット装着部3に装着して装着完了直前まで、カセット本体60の右側面から突出した操作ボタン94が溝部95aに沿って移動する。このとき、第2挟持部73は上糸24に通過抵抗を付与する。上糸カセット57をカセット装着部3に完全に装着し上糸カセット57の装着が完了した状態では、操作ボタン94が上糸開放カム95に当接して左方へ押動された状態となる。このとき、第2挟持部73は開放状態となり、上糸24に通過抵抗が付与されなくなる。

【0078】次に、天秤機構8について詳しく説明する。図11～図14に示すように、この天秤機構8は、上糸カセット2をカセット装着部3に装着する動作に連動して糸掛け部26に上糸24を糸掛けできるように工夫した特有の構造のものである。この天秤機構8は、カム式天秤機構を例としているが、リンク式天秤機構にも同様に、以下の構成を適用可能である。この天秤機構8は、主軸の駆動力で天秤クランク20を介して駆動される天秤25と、この天秤25の糸掛け部26の移動軌跡の全長に沿って湾曲状に延びる糸案内隙間108を形成する糸案内材106Aを有し、この糸案内隙間108に上方から上糸24を導入して糸掛け部26に糸掛け可能に構成してある。

【0079】糸案内材106Aは、天秤25の先端部（糸掛け部26）の移動軌跡の全長に沿って湾曲状に延び糸案内隙間108を空けて前後に離隔した1対の糸案内具106からなる。1対の糸案内具106は下端部で連続した1本の線状部材（金属製又は合成樹脂製）で構成され、後側の糸案内具106の上端部分が後方へ水平に延びてマシン機枠の頂部枠に枢支金具107を介して回動自在に支持され、糸案内材106Aの下端部は自由端をなしている。前側の糸案内具106の上端部は前側へ屈曲されて、糸案内隙間108へ上方から上糸24を導入する為の導入口108aが形成されている。尚、糸案内材106Aと天秤25の糸掛け部26は、カセット装着部3の後壁の開口からカセット装着部3内へ突出している。

【0080】天秤25の先端側部分には、先端側所定長さ部分を後方へ折り返すことで形成された平面視にてU形の案内部25aが設けられている。1対の糸案内具10

6はU形案内部25aを相対摺動自在に挿通しており、U形案内部25aが上下に往復運動するとき、1対の糸案内具106は上端部において回動しながらU形案内部25aで案内されるため、U形案内部25aに対する摺動抵抗も小さく、騒音も殆ど発生しない。U形案内部25aのうちの1対の糸案内具106の間（つまり、糸案内隙間108）に対応する部位には、上方から上糸24を掛ける糸掛け部26であって上面に上糸を掛けるU形凹部を有する糸掛け部26が形成されている。

【0081】従って、糸駒62の軸心を天秤25の糸掛け部26の往復移動方向とほぼ平行にして、上糸カセット2を鉛直上方から装着するとき、その装着動作に連動して自動的に、上糸カセット57の第3案内部72と第2挟持部73の間の上糸24を導入口108aから糸案内隙間108に導入して天秤25の糸掛け部26に簡単に掛けることができる。尚、糸案内材106Aは、線状部材ではなく、金属製又は合成樹脂製の板状部材で構成してもよい。

【0082】次に、上糸カセット2の作動を自動糸通し機構10に伝達する伝達機構115について説明する。図5～図8に示すように、この伝達機構115は、上糸カセット2の作動を糸通しスライダ作動機構116を介して自動糸通し機構10に伝達すると共に、糸通し位置決め部材52との係合により解除作動する係合機構117が設けられている。この糸通しスライダ作動機構116は、糸通しスライダ作動部材軸118（以下、軸118という）と、糸通しスライダ作動部材119と、糸通しスライダ作動部材レバー120（以下、レバー120という）と、糸通しスライダ作動爪121（以下、作動爪121という）と、糸通しスライダ作動爪バネ122（捩じりバネ122）と、糸通しスライダ作動部材ストッパー123（以下、ストッパー123という）等から構成されている。

【0083】図4、図5、図10に示すように、カセット装着部3の近傍においてアーム部6内には、軸118が鉛直方向に支持され、この軸118に側面視略コ字形状の糸通しスライダ作動部材119が上下動可能に支持されている。糸通しスライダ作動部材119には平面視コ字形状のレバー120が固着され、このレバー120の前板部のうち右端の略中段部に、板状のレバー部120aが前方に突出するように設けられている。レバー部120aの先端部は、アーム部6内からカセット装着部3の受止め部109を貫通して所定長さ突出するように形成されている。受止め部109の略中段部から下端にわたりスリット124が形成され、レバー部120aがこのスリット124に沿って上下動可能に構成されている。

【0084】軸118の上端近傍の天板にはブラケット125が固着され、軸118の背面側で且つストッパー123とレバー120とにわたり引張コイルバネ126が介装され、レバー120（つまりレバー部120a）を上方に付勢するようになっている。尚、上糸カセット2の装着完了状態

(縫製位置)を保持するため、引張コイルバネ126 の付勢力よりも糸保持ボタン94とカム95間に作用する摩擦抵抗が大きくなるように構成されている。

【0085】係合機構117 について説明すると、図4～図8に示すように、レバー120 の右端側上部には、作動爪121 が枢支されている。この作動爪121 は、その下端部が糸通しスライダ爪44の爪部44aに係合可能なロック位置と、爪部44aとの係合状態が解除された解除位置とにわたって揺動可能に構成されている。但し、枢支軸127 には、糸通しスライダ作動部材119 、作動爪121 間に作用する振りバネ122 が外装され、作動爪121 をロック位置側に付勢するようになっている。

【0086】作動爪121 の下端部は、オフセット部材カム部53に対して当接離隔可能に構成され、糸通しスライダ作動部材119 をロック位置の状態下方に押し下げると、作動爪121 の下端部がオフセット部材カム部53の傾斜部53aに当接し傾斜部53aに沿って左方に移動し、オフセット部材48の上支持部49の右端部分が、糸通し位置決め部材52に上方から当接した状態で、図6に示すように、解除位置に切り換わって係合機構117 が解除作動されるように構成されている。作動爪121 が解除位置に切換わると、糸通しスライダ40及びオフセット部材48は、図6に示す下限位置から圧縮コイルバネ46、47の付勢力により上方復帰するようになっている。

【0087】ストッパー123 について説明すると、図4～図8に示すように、ブラケット125 の左端部には、ストッパー軸128 が前後方向向きに支持され、このストッパー軸128 に側面視略逆し字形のストッパー123 が枢支されている。ストッパー123 は、ストッパー軸128 から略鉛直下方向きに延びる鉛直部129 と、ストッパー軸128 から略水平右向きで且つ針棒18の上方位位置まで延びる水平部130 と、これら鉛直部129 と水平部130 を図8において時計回り方向に付勢する前記引張コイルバネ126 (図10参照)とを有する。鉛直部129 の下端部には、下方に向かう程左斜め向きに傾斜する傾斜部131 が形成されている。

【0088】傾斜部131 と鉛直部129 の交差する左端部分にストッパー部132 (段部に相当する)が形成され、糸通しスライダ作動部材119 の下端部には、このストッパー部132 に上方から係合可能なストッパー係合部119aが形成されている。針棒18の上端つまりストッパー123 が(イ)から(ロ)の適正範囲にある場合(図8参照)には、上糸カセット2により糸通しスライダ作動部材119 が図5に示す上限位置から下方に移動するとき、ストッパー係合部119aがストッパー123 の傾斜部131 に接触し、その後、傾斜部131 の左端に対して糸通しスライダ作動部材119のガイド壁119bが摺動する。

【0089】糸通しスライダ作動部材119 の下方移動に伴い、ストッパー123 が引張コイルバネ126 の付勢力に

抗して反時計回り方向に揺動するから、糸通しスライダ作動部材119 は上限位置から図6に示す下限位置まで移動可能となる。針棒18の上端が適正範囲外にある場合には、ストッパー123 が(ロ)の位置(図8参照)から更に時計方向回りに揺動する。この状態で糸通しスライダ作動部材119 を下方に移動させようとしても、ストッパー部132 に対してストッパー係合部119aが係合するから、糸通しスライダ作動部材119 は移動不可能となり、糸通しが禁止される。

【0090】図7に示すように、糸通しスライダ作動部材119 のガイド壁119bが、ストッパー123 の傾斜部131 に摺動することで、ストッパー123 の水平部130 の高さ位置が規制されて、最上位置のときの針棒18の上端と水平部130 との間に微小隙間Sが形成され、針棒18とストッパー123 との打撃音の発生を防止している。

【0091】次に、糸調子器9と、糸調子器9の為の連動機構134 について説明する。連動機構134 は、上糸カセット2のカセット装着部3への装着動作の途中において上糸カセット2により1対の糸調子皿133 を開放させ且つ装着動作の完了時には糸調子皿133 を閉じさせる機構である。図4、図10、図16、図37～図45に示すように、糸調子器9は、上糸カセット2がカセット装着部3に装着された状態ではカセットケース57内の糸調子器収容部57c に突入する。糸調子器9は1対の糸調子皿133 と、これら糸調子皿133 を支持する軸部材と、後側の糸調子皿133 の後側にある作動板139 と、後側の糸調子皿133 と作動板139 を前方へ弾性付勢するバネ部材と、糸調子皿133の付近で上糸24を弾性的に支える糸調子バネ135 と、バネ力調節用の糸調子ダイヤル136などを備えた一般的な構造のものである。

【0092】図37～図45に示すように、連動機構134 は、上糸カセット57の後側面に形成されたカム部137 と、縦向きのレバー状のカム従動部材138 と、回転アーム151 とを有する。カセット本体60の後壁のうち左端側部分の上半部には、後方にやや突出する突条のようなカム部137 が形成されている。糸調子器9を支持するフレーム140 の上部にはブラケット141 が形成され、このブラケット141 には、カム従動部材138 の長さ方向途中部が左右方向向きの水平ピンにて回転自在に支持され、このカム従動部材138 は振りバネ144 により図41において時計回り方向へ付勢されている。

【0093】カム従動部材138 の上端部にはローラ142 が遊転可能に枢着されている。カセット装着部3の後壁の左側部分には、上糸カセット57のカム部137 を後方へ突出させるスリット143 (図14参照)が形成され、このスリット143 から後方へ突出したカム部137 にローラ142 が当接可能になっている。回転アーム151 の右端部は縦向きのピンにてベース板155 の下板部にピン連結されて水平回転可能であり、カム従動部材138 の下端部が回転アーム151 の左端部分の後面に当接し、回転アーム

ム151 の突部151aが作動板139 に当接可能になっている。

【0094】カム部137 の形状とローラ142 の位置を適切に設定することで、上糸カセット57の装着途中において糸調子皿133 を開かせて1対の糸調子皿133 と糸調子バネ135 に糸掛けし、その後上糸カセット57の装着完了時に糸調子皿133 を閉じるように構成してある。即ち、上糸カセット57がカセット装着部3に装着されて上糸カセット2が糸調子器9の上方所定距離まで達したときに、カム部137 にローラ142 が乗り上げてカム従動部材138 が図41において反時計回りに回転し、回転アーム151 と作動板139 とで糸調子皿133 を開かせる。

【0095】その状態で上糸カセット57が下降して来ると、第2、第3案内部71、72間の上糸24が1対の糸調子皿133 の間に糸掛けされ、その後上糸カセット57が装着完了状態になる頃カム部137 は低くなりローラ142 を後方へ押さなくなるので、回転アーム151 が後方へ復帰回転し、作動板139 が後方へ復帰移動し、1対の糸調子皿133 が閉じた状態になる。尚、以上の上糸カセット57の装着時の連動機構134 の作動は、押え上げレバー29の位置（下方回転位置または上方回転位置）に関係なく生じる。

【0096】次に、通常のミシンと同様に、押え上げレバー29の操作で1対の糸調子皿133 を開かせる機構は、周知の機構であるので簡単に説明する。図37～図45に示すように、押え上げレバー29の上端部は機枠に回転自在に枢支され、この押え上げレバー29のカム部29aに係合した係合アーム152 の上端部も機枠に回転自在に枢支されている。係合アーム152 は連結ロッド153 により水平な三角板154 の後端部に連結されている。三角板154 は機枠側のベース板155 下板部の下側に配設され、この三角板154 の前端部の左端部がベース板155 の下板部に縦向きのピンにて回転自在に枢着され、三角板154 の前端部の右端部が作動板139 に当接している。

【0097】従って、押え上げレバー29が下方回転位置にあるとき、連結ロッド153 が右方へ引っ張られないので三角板154 が回転せず、糸調子皿133 が閉じた状態を保持する。押え上げレバー29を上方回転位置に切換えると、連結ロッド153 が右方へ引っ張られるため三角板154 が回転して糸調子皿133 が開いた状態となる。

【0098】次に、前記ミシン1の作用と上糸カセット2の作用について説明する。図14、図23～図27に示すように、上糸カセット2をカセット装着部3に装着してない状態において、上糸カセット2の開閉蓋61を開き糸駒62を糸駒保持部58に装着する。次に、糸駒62から引き出した上糸24を第1案内部69に掛け、第1挟持部70の糸案内部80aに掛けて板バネ81で押圧する。次に、その上糸24を第2、第3案内部71、72に順々に掛け、第2挟持部73の案内ピン89

と糸保持板90との間に挟持させる。

【0099】次に、板バネ部材91の付勢力に抗して操作ボタン94aを指で押圧し、案内ピン89を糸保持板90から離隔させてから、上糸24を外側へ所定長さ引っ張り出し、その後操作ボタン94aを押圧するのを解除して第2挟持部73のにより上糸24を挟持し、開閉蓋61を閉じる。尚、上糸カセット2への糸掛け手順を判り易くするため、第1案内部69、第1挟持部70、第2、第3案内部71、72、第2挟持部73の各近傍に糸掛け順指示マークを貼着し、そのマークの順番に従って糸掛けさせるように構成してもよい。

【0100】一方、ミシン1が縫製停止状態のときには、通常針棒18は針上位置に停止しており、天秤25の糸掛け部26は図13に示す糸締め側の略中段位置に停止している。この状態において、カセット装着部3に上方から上糸カセット2を装着していく。カセット装着部3は上方と下方の両方に開放されているため、上糸カセット2の糸出口68から約20cm程度引出された上糸24は、カセット装着部3の下方に鉛直向きに垂れ下がる。尚、縫製開始時には、天秤25の糸掛け部26は前記の糸締め側の略中段位置から上昇してから下降することになる。

【0101】図15、図16に示すように、上糸カセット2の装着途中において、上糸カセット2の係合部112がレバー部120aに当接した状態で上糸カセット2を一旦停止させる。このとき、図15に示すように、第3案内部72と第2挟持部73との間の上糸24が糸案内隙間108に導入されて天秤25の糸掛け部26に掛かった状態になっている。この場合、第2挟持部73は第1挟持部70よりも強い通過抵抗を与えるから、上糸24がカセット2内に引き戻されることなく糸駒62から上糸24が必要量繰出される。尚、この移動停止位置を確認する為の1対の合印146 が上糸カセット2とミシン1に設けられている。

【0102】次に、上糸カセット2の糸出口68から下方に垂れ下がった上糸24を、針棒糸掛け147 と糸ガイド36aに順に掛け、支持板55と糸案内皿56との間に微圧にて挟持させた後、糸端を図示外の糸切り刃で切る。次に、図17に示すように、上糸カセット2を引張コイルバネ126の付勢力に抗して下方に押下げると、上糸カセット2の作動が伝達機構115を介して自動糸通し機構10に伝達され、針穴19aへ上糸24を通す糸通しが行われる。上糸カセット2の糸通し作動部としての係合部112がレバー120の先端のレバー部120aを下方へ移動させるため、上糸カセット2の移動が伝達機構115に伝達される。これと並行して、天秤25に対して上糸カセット57が相対的に下方移動するため、第3案内部72と第2挟持部73間の糸経路が長くなる関係上、糸駒62からの上糸24の繰り出しがなされる。

【0103】このとき、既述の如く、連動機構134 によ

り糸調子器9の糸調子皿133を開放させ、第2、第3案内内部71、72間の上糸24が糸調子皿133の間と糸調子バネ135に糸掛けされる。第1挟持部70と第2挟持部73とにより両部間の上糸24に一定の張力を付与しているから、天秤25、糸調子皿133、糸調子バネ135に確実に上糸24が掛かることになる。第2挟持部73は第1挟持部70よりも強い通過抵抗を上糸24に与えるから、上糸24が第2挟持部73を逆流してカセット2内に引き戻されることはなく、前記のような糸掛けに必要な量の上糸24は糸駒62から確実に繰り出される。しかも、第1挟持部70から第2挟持部73間の上糸24に弛みが生じないため、その上糸24に糸よりいる糸の絡まり等が生じることもない。

【0104】図19、図20に示すように、上糸カセット2をカセット装着部3に装着完了した状態(即ち、受止め部109に係合部112が上方から係合した状態)においては、連動機構134により糸調子皿133が閉じ、糸通しスライダ作動部材119は上糸カセット2により最下位置に保持されたまま、糸通し軸31とスライダガイド軸32が上方へ復帰して針穴19aに上糸24が通される。また、図20に示すように、操作ボタン94aが糸開放カム95で左方へ押動され、案内ピン89が糸保持板90から離隔して第2挟持部73が開放状態となり、上糸24が開放されて縫製可能状態となる。

【0105】しかも、上糸カセット57の装着が完了した状態において、1対の糸調子皿133が閉じ、第2挟持部73が開放状態になった場合でも、第1挟持部70で上糸24を挟持し、上糸24に通過抵抗を与えるようになっているため、上糸カセット57内の上糸24に糸より糸の絡まり等が生じることはない。その結果、縫製中に糸の絡まりによる糸切れが生じにくくなる。このカセット装着部3に上糸カセット2を装着した状態において、糸案内部材106Aと天秤25の糸掛け部26が上糸カセット57内へ突出し、天秤25の糸掛け部26が上糸カセット2内をほぼ鉛直方向に往復移動可能となる。

【0106】ここで、図19に示すように、カセット本体60の糸調子器収容部57cにおいて、糸調子器の下流側に、下方に切欠き状に形成された糸案内内部を含む上糸押え部材180(鎖線で図示)を設け、上糸カセット2のカセット装着部3への装着動作により糸調子器9からその下流側に延びた上糸24を下方に押下げ配置するようにしてもよい。この場合、上糸24の糸調子器9の軸部材への接触部分が増し上糸24が不意に外れたりしなくなるし、糸調子バネ135による上糸24の取り上げ量を多くすることができる。上糸カセット2を取り外す際には、上糸24を上糸押え部材180から簡単に解離することができる。

【0107】以上のように、上糸カセット57をカセット装着部3に装着した状態で、糸駒62から上糸24を

供給しながら縫製を行うことができる。上糸24の糸色を変更したり、上糸24を補充したりする為に、上糸カセット2をカセット装着部3から取外す際には、上糸カセット2の下端を指で上方へ押すことにより簡単に取外すことができる。

【0108】その取り外し後、上糸カセット2内には、天秤25と糸調子器9から外された弛み糸が残るので、操作ボタン94aを指で押して第2挟持部73を開放状態に切換え、その状態のまま上糸カセット2内の弛み糸を外側へ引き出し、カセット外周に巻き付けて上糸24の糸端部分を糸止め部104又は糸止め部104Aに仮止めする。その後、操作ボタン94を復帰させて第2挟持部73を閉じた状態にする。

【0109】図46、図47に示すように、前記開口部77、78は、上糸カセット2の外部の糸駒62Aから延びた上糸を第1案内内部69に導入する導入用開口部77、78でもあり、上糸カセット2内の糸駒62を取り外した状態で、上糸カセット2の外部の上糸24を使用して縫製する場合には、その糸駒62Aから延びた上糸24を導入用開口部77、78から第1案内内部69へ導き、糸経路59を通過して糸出口68に導くことができる。例えば、図48に示すように、針として2本針19Aを適用する場合には、上糸カセット2内部の糸駒62の上糸24と、外部の糸駒62Aの上糸24とを糸経路59を通して糸出口68に導き、2本の上糸24を2本針19Aに供給することが可能となる。

【0110】本実施形態に係るミシン1と上糸カセット2は次の効果を奏する。

1) 上糸カセット2内に糸駒62を収容し、上糸カセット2を交換することで糸駒62を交換可能にしたので、上糸24の交換が簡単になった。特に、上糸カセット2の装着動作に連動して、天秤25の糸掛け部26と糸調子器9の糸調子皿133と糸調子バネ135とに自動的に糸掛けするので、糸掛けの操作が非常に簡単になり能率的に行うことができる。上糸カセット2の装着動作に連動して、自動糸通し機構10を作動させて針穴29aに自動的に糸通しするので、糸通しも非常に簡単になり、上糸24の交換を迅速に能率的に行うことができる。

【0111】特に、縫製を停止し、針棒18を針上位置に停止させると共に天秤25の糸掛け部26を糸締め側の位置に停止させた状態で、天秤25の位置を変えることなく、上糸カセット2を装着して天秤25の糸掛け部26と糸調子器9に糸掛けできるため、上糸カセット2の装着と糸掛けの操作が非常に簡単で能率的に行うことができる。しかも、上糸カセット2を上方から直線的に移動させることでカセット装着部3に装着でき、また、装着状態の上糸カセット2を上方へ直線的に移動させて取り外すことができるため、上糸カセット2の着脱操作が簡単で、上糸カセット2を迅速に交換できる。

【0112】また、上糸カセット2のカセットケース5

7が透明であり、内部の糸駒62の糸色を容易に識別できるため、上糸24の交換、或いは上糸カセット2の交換の際に便利である。上糸カセット2の内部の糸駒62を支持する支持壁63に凹部65を形成したので、この凹部65に指をかけて糸駒62の下端を押し、糸駒62を糸駒保持部58から簡単に取り外すことができる。

【0113】2) 上糸カセット2内に糸駒62をその軸心を縦向きにして保持し、その糸駒62から上方へ上糸24を繰り出し、糸経路59を通して糸出口68に導くように構成したので、上糸カセット2の左右方向幅を小さくすることができる。或いは、糸駒62の軸心と糸駒62からの上糸24の繰り出し方向を天秤25の糸掛け部26の往復移動方向とほぼ平行にして上糸カセット2をカセット装着部3に装着するように構成であるため、上糸カセット2の左右方向幅とカセット装着部3の左右方向幅を小さくすることができる。

【0114】このように、上糸カセット2は、左右方向幅の小さな縦長の直方体に近い小型のものであるので、天秤25の糸掛け部26の往復移動領域とその左側の部位に、つまりアーム頭部にカセット装着部3を配置することができた。その結果、天秤25の糸掛け部26の往復移動領域と重なる領域にカセット装着部3を形成することができスペース的に有利である。また、アーム部6の内部機構と干渉させずにカセット装着部3を極力後方に配置することができ、これにより上糸カセット2を装着した状態で上糸カセット2がアーム部6の前面から突出せず、アーム部6の外観も低下せず、アーム部6の前面のデザイン上の自由度も確保できる。

【0115】3) 上糸カセット2内の糸経路59の上流部に上糸24に常時通過抵抗を与える第1挟持部70を設け、上糸カセット24を装着した状態で、第1挟持部70と糸調子器9間の上糸24を緊張状態に維持するため、糸よりによる糸の絡まりの発生を防止でき、縫製中に糸の絡まりに起因する糸切れや糸のひきつりを防止できる。

【0116】そして、糸出口68の付近に第2挟持部73を設け、上糸カセット2の装着前や装着完了前には上糸24に通過抵抗を与えるようにし、第2挟持部73は第1挟持部70よりも強い通過抵抗を与えるため、上糸カセット2の取扱中に上糸24が勝手に繰り出されることもなく、また、上糸カセット2の装着時に天秤25の糸掛け部26と糸調子器9に糸掛けする際に、上糸を糸駒62から確実に繰り出すことができる。

【0117】そして、上糸カセット2を装着しない状態では、操作ボタン94aを指で操作して第2挟持部73を開放させ、上糸24を自由に繰り出すことができる。上糸カセット2の装着完了後には操作ボタン94aを上糸開放カム95で押圧して第2挟持部73を開放状態に切換えるため、縫製中には第2挟持部73の通過抵抗が上糸24に作用せず、上糸24の繰り出しが円滑

になる。上糸カセット2をカセット装着部3から取り外した際にカセットケース57外へ延びる上糸24をカセットケース57の外面に巻付けて、その糸端部分を糸止め部104,104Aに止めることができるので、非常に便利である。

【0118】4) 上糸カセット2の頂部に第1案内部69と、前後に細長い開口部77, 78と、これに平行に臨む案内ピン75の糸案内部とを設けたため、上糸24が案内ピン75に沿って自由に移動でき、その上糸24を糸駒62から抵抗なく円弧を描くようにして円滑に繰り出すことができるうえ、上糸カセット2の外部に配置した糸駒からの上糸を開口部77, 78から上糸カセット2内に導入し、その内部の糸経路59により糸出口68に導いて縫製に供することができる。そのため、針19の代わりに2本針を装着して2本の上糸で縫製する際に、上糸カセット2内の糸駒62と上糸カセット2外のアーム部6の頂部の糸駒保持部に保持した糸駒とから上糸を供給して縫製することができる。

【0119】5) 上糸カセット2の装着動作に連動して糸調子器9を開放状態にし、上糸カセット2の装着後には糸調子皿133を閉じる連動機構134を設けたため、前記のように上糸カセット2の装着動作に連動して糸調子器9に糸掛けすることができる。尚、カセット装着部3の下端側部分に糸調子器9を配置したので、上糸カセット2をカセット装着部3に上方から装着する装着動作と連動して糸調子器9に糸掛けするのに特に有利である。

【0120】6) 天秤機構8は特有の構造のものであり、上糸カセット2の装着動作に連動して糸掛け部26に糸掛けするのに好適のものである。即ち、天秤25の糸掛け部26の移動軌跡の全長に沿って延びる湾曲状の糸案内隙間108を形成する糸案内部材106Aを設け、糸案内隙間108の上端の導入口108aから上糸24を導入して糸掛け部26に糸掛け可能に構成してある。そのため、糸導入口108aは糸掛け部26の移動軌跡から後方へ後退しない位置にあるから、天秤25の糸掛け部26を前記の糸締め側の位置(針棒18の針上停止位置に対応する位置)に停止させたまま、上糸カセット2のカセット装着部3への装着動作と連動して糸掛け部26に糸掛けすることができる。

【0121】しかも、糸案内隙間108は、糸掛け部26の移動軌跡の全長にわたるものであり、糸案内部材106Aをなす1対の糸案内具106を天秤25のU形案内内部25aに相対摺動自在に挿通させてあるので、縫製時に天秤25が上下に往復移動しても、上糸24は糸案内具106で案内され、糸掛け部26から外れることはない。また、後側の糸案内具106の上端部を回動自在に枢支してあるため、天秤25のU形案内内部25aで1対の糸案内具106を案内できるから、1対の糸案内具106を線状部材のような加工し易い材料で安価に構成できるうえ、U形案内内部25aと1対の糸案内具106間に摺動抵抗が殆

ど作用しなくなり、摺動音も殆ど生じない。

【0122】7) 前記自動糸通し機構10において、針棒18が針上位置のうちの所定高さ範囲にある場合に限り、つまり、ストップ123が図8の(イ)～(ロ)の適正範囲にある場合に限り、上糸カセット2の装着動作と連動する針穴19aへの自動糸通しが可能になっているため、針棒18の位置が不適切なまま、上糸カセット2を装着して針穴19aへの糸通しミスを起こすおそれなく、操作の信頼性、操作性に優れる。しかも、針棒18が針上停止する位置に誤差が生じることに鑑み、糸通しスライダ40と、針棒18に設けた糸通し位置決め部材52との係合を介して、針棒18に対する自動糸通し機構10の高さ位置を合致させるように構成してあるため、針穴19aに確実に糸通しすることができる。

【0123】次に、前記実施形態を部分的に変更した変更形態について説明する。図19は、前記ミシン1の制御系の概要を示すものであり、制御ユニットには針上、針下検出センサ、主軸位相角検出センサ、その他図示外のセンサやスイッチ類からの信号が入力される。制御ユニットは、ミシン制御用の種々の制御プログラムに基づいて制御を行うコンピュータと複数の駆動対象機器の為の複数の駆動回路などを有する。この制御ユニットによりミシンモータ、針振り用ステッピングモータ、布送り用ステッピングモータ、などが駆動制御される。

【0124】前記針棒18が針上位置にある場合にのみ、カセット装着部3への上糸カセット2の装着を許可し、針棒18が針上位置以外の位置にある場合には上糸カセット2の装着を禁止する為に、カセット装着部3の上端付近にはカセット装着部3内へ出沒可能なストップを設け、このストップを出沒駆動する例えばソレノイドアクチュエータなどからなる電動アクチュエータを設け、針上、針下検出センサからの検出信号に基づいて制御ユニットにより電動アクチュエータを駆動制御し、針棒18が針上位置にある場合にのみストップを退入位置に保持することで上糸カセット2の装着を許可し、針棒18が針上位置以外の位置にある場合にはストップを進出位置に切換えて上糸カセット2の装着を禁止する構成とする。

【0125】次に、本発明の別実施形態について図面を参照して説明する。但し、前記実施形態と同じ部材には同一の符号を付して説明を適宜省略する。図50～52に示すように、別実施形態に係る電子制御式ミシン1Aにおいて、アーム部6の先端側部分のうちの天秤25の糸掛け部26が上下に往復移動する天秤移動領域とその近傍部の前面部には操作体装着部200が形成され、この体装着部200に着脱可能に装着される可動操作体としての糸掛け用操作体201と、糸調子器9と、抵抗付与部205と、糸掛け用操作体201の装着動作に連動して糸調子器9の糸調子皿133と抵抗付与部205を開閉させる連動機構202(図58参照)などが設けられている。

【0126】最初に糸経路について説明すると、図50～図52に示すように、アーム部6の基端側の頂部に横向きに保持された糸駒62Aから延びる上糸24は、順次、アーム部6の上面側部分に形成された左右方向向きの糸案内溝203、操作体装着部200、アーム部6の先端側の前面部に形成された縦向きの糸案内溝204を経由して針棒糸掛け147、糸ガイド36a、糸案内皿56に掛けられる。糸案内溝203にはその上流側から順に抵抗付与部205と糸調子器9が配設されている。操作体装着部200の中央部において上下に往復移動するように天秤25の糸掛け部26が配設されている。尚、糸調子器9のバネ力を調節する為の糸調子ダイヤル206も装備されている。

【0127】次に、糸掛け用操作体201について説明する。図50、図51、図54、図55、図57～図59に示すように、糸掛け用操作体201は、鉛直方向に細長い略直方体状のもので、操作体装着部200に対して少なくとも所定範囲内で移動可能である。糸掛け用操作体201は、上端から下端のやや上方まで連なる前壁部201cと、左側壁201aと、右側壁201bとを有する。左側壁201aの後端には左方へ折曲された被案内内部208が形成され、この被案内内部208が操作体装着部200のスリット200aで上下動可能に案内される。右側壁201bの後端には右方へ折曲された被案内内部208bが形成され、この被案内内部208bが操作体装着部200の案内溝200bで上下動可能に案内される。糸掛け用操作体201の前壁部201cは、操作体装着部200の前側の案内壁部200cで上下動自在に案内可能に構成してある。

【0128】左側壁201aと右側壁201bの下端面は水平に形成され、右側壁201bの下端部は糸掛け用操作体201を操作体装着部200に挿入装着する際に、糸調子器9から天秤25に延びる上糸24を操作して糸掛け部26に糸掛けする上糸操作部である。糸掛け用操作体201の上端部には、前方にやや突出する突出部209が形成され、この突出部209に指をかけて糸掛け用操作体201を上方移動させ操作体装着部200から離脱可能になっている。

【0129】図50、図53～図55、図62に示すように、被案内内部208の下端部には、上糸24を針穴19aに糸通しする際に自動糸通し機構10を動作させる糸通し作動部としての作動部208aが形成されている。糸通しスライダ作動機構116において、レバー120には右端の上段部から前方にL字状に突出するレバー一部120bが形成され、糸掛け用操作体201の装着動作の途中からレバー一部120bを上方から押動駆動し、前記実施形態と同様の自動糸通し機構10を動作させる。

【0130】操作体装着部200の壁面には、操作体装着部200から離脱させた糸掛け用操作体201を図54に示す最上位置に保持する板バネ210がビス止めされている。尚、糸掛け用操作体201を操作体装着部200から取外し可能に構成してもよく、この場合には、天秤25の

糸掛け部26への糸掛けが簡単になる。操作体装着部200は、アーム部6の前面近傍部であって天秤移動領域の近傍部に、糸掛け用操作体201を鉛直に直線的な移動にて装着可能に形成され、糸掛け用操作体201を円滑に挿入装着できるように構成してある。

【0131】次に、糸掛け用操作体201の装着の動作を糸調子器9に連動させる連動機構202について説明する。図53～図62に示すように、連動機構202は、カム部211とカム従動部材212と作動板213とを有し、糸掛け用操作体201を操作体装着部200に装着する装着動作の途中において糸掛け用操作体201により糸調子器9の糸調子皿133と抵抗付与部205を開放させ且つ装着動作の完了時には糸調子皿133と抵抗付与部205を閉じるようになっている。即ち、図54に示すように、糸掛け用操作体201の右下半部には、上下方向に沿ってカム部211が形成され、このカム部211には下方から順に、傾斜部211a、平坦部211b、傾斜部211c、平坦部211dが形成されている。

【0132】ミシン機枠に枢支された支軸214には、カム従動部材212の下端部が回動自在に支持されている。このカム従動部材212は、2枚のレバー部215、216と、これらレバー部215、216を下端部に一体的に連結する連結部217と、カム従動ピン218などを有する。2枚のレバー部215、216は、適当間隔空けて平行に且つ側面視で約15度の位相角となるように配設され、レバー部215の一端即ち上端部には、カム従動ピン218が左方に突出するように付設され、このカム従動ピン218がカム部211に当接可能に構成されている。

【0133】図54、図58に示すように、糸調子器9には、レバー部216の上端部(カム従動部材の他端部)で押動駆動される作動板213が設けられ、この作動板213に押動駆動されて糸調子皿133が開放する。支軸214には、振りバネ219が外装され、図58においてカム従動部材212を反時計方向回りに付勢している。抵抗付与部205は、糸調子器9よりも上流側において上糸24に適度な通過抵抗を付与し、上糸24に糸よりによる糸の絡まり等が発生するのを防止する為のものである。前記レバー部216の上端部は右方へ直角に折曲され、その水平板部220により、作動板213が糸調子皿133を開くのと同期して抵抗付与部205の押え板205aを押動駆動して押え板205aを開くようになっている(図60、図61参照)。水平板部220の非作動時には、押え板205aは抵抗付与バネ205bの付勢力により閉じた状態に保持されている。

【0134】次に、以上説明したミシン1Aの作用について説明する。図50～図52に示すように、糸駒62Aより引出した上糸24を操作者によって糸案内溝203に通し、糸掛け用操作体201を最上位置に移動させた状態において、上糸24を天秤25の糸掛け部26に掛け、糸案内溝204に通して針19の付近まで引き出し、

針棒糸掛け147、糸ガイド36a、糸案内皿56に掛ける(図5参照)。次に、糸端を一定長さに切断し、糸掛け用操作体201を操作体装着部200に直線的に押込み操作して、操作体装着部200に挿入装着していく。

【0135】この装着動作に伴い、まず、カム従動ピン218がカム部211の傾斜部211aに当接して、糸調子皿133と押え板205aを開放してこれらに上糸24を糸掛けする。これと並行して、糸調子バネ135にも糸掛けされ、糸掛け用操作体201の右側壁201bの下端部の上糸操作部により、糸調子器9と天秤25の糸掛け部26間の上糸24が天秤25の両側の糸経路を長くするように下方へ押し下げられ、天秤25の糸取り量が確保される。

【0136】その後、平坦部211b、傾斜部211cがピン218に当接し、図62、図63に示す略装着完了状態において平坦部211dがピン218に当接すると、糸調子皿9と押え板205aが閉じる。一方、糸掛け用操作体201を操作体装着部200に挿入装着する途中から、前記実施形態と略同様に、糸掛け用操作体201の作動が伝達機構115を介して自動糸通し機構10に伝達され、この自動糸通し機構10により針穴10aへの糸通しが実行され縫製可能状態となる。このとき、作動部208aがレバー部120bを下方へ押動させるため糸掛け用操作体201の装着動作が伝達機構115に伝達される。

【0137】以上説明したミシン1Aと糸掛け用操作体201は、次の効果を奏する。

1) 前記上糸カセット2の代わりに、鉛直方向に細長い糸掛け用操作体201を採用しているため、糸掛け用操作体201と操作体装着部200の小型化を図ることができ、アーム部6の前面の外観への影響も少なくすることができる。

【0138】2) 連動機構202は、糸掛け用操作体201を操作体装着部200に装着する装着動作の途中において、その装着動作と連動して、糸掛け用操作体201により糸調子器9の糸調子皿133と抵抗付与部205の押え板205aを開放させ、その開放状態の糸調子器9と抵抗付与部205に上糸24を掛けることができる。そして、糸掛け用操作体201の装着動作の完了時には糸調子皿9と抵抗付与部205を閉じさせることができる。この糸掛けと並行的に、糸掛け用操作体201を操作体装着部200に装着する装着動作と連動して、自動的に糸通しを行うこともできる。

【0139】こうして、糸掛け用操作体201の装着に連動して上糸24を糸調子器9と抵抗付与部205に糸掛けすることができると共に自動糸通しを行うことができるため、上糸24の補給や交換時の糸掛け操作と糸通し操作が簡単化し、上糸交換の作業効率が高まる。

【0140】3) 連動機構202は、糸掛け用操作体201に形成されたカム部211と、一端がカム部211に当接可能で且つ長さ方向途中部が回動自在に支持されたカム従動部材212と、このカム従動部材212の他端部で押動駆

動されて糸調子器9を開放させる作動板213 とを有するため、糸調子器9としては一般的な構成の安価な糸調子器9を採用可能となる。

【0141】尚、前記糸掛け用操作体201 は、マシン1Aのアーム部6に直接連結しておらず、アーム部6から取り外し可能な構成であったが、糸掛け用操作体201 をアーム部6に平行リンク、その他のリンク機構や揺動リンク部材を介して連結した構成にしてもよい。

【0142】

【発明の効果】 請求項1の発明によれば、アーム部に少なくとも所定範囲内で移動可能な可動操作体を設け、この可動操作体の前記所定範囲内で移動させることにより、上糸を天秤の糸掛け部にセットすると共に、前記自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したので、可動操作体の移動に連動させて、天秤の糸掛け部に糸掛けし且つ上糸を針穴に糸通しすることができるため、天秤の糸掛け部への糸掛け作業や針穴への糸通し作業を簡単化し、作業能率を高めることができる。

【0143】請求項2の発明によれば、上糸を天秤の糸掛け部に糸掛けする際に上糸操作部により上糸を操作して糸掛けすることができるうえ、上糸を針穴に糸通しする際に糸通し作動部により自動糸通し機構を作動させて糸通しを行うことができる。その他請求項1と同様の効果を奏する。

【0144】請求項3の発明によれば、前記マシンのアーム部の前部又は前面部に可動操作体を着脱可能に装着する為の操作体を形成したため、可動操作体の着脱操作を行いやすくなるうえ、アーム部の前面部に位置している天秤の糸掛け部や糸調子器に上糸を掛ける面でも有利である。その他請求項1又は2の発明と同様の効果を奏する。

【0145】請求項4の発明によれば、可動操作体は糸駒を収容しかつその糸駒から繰り出された上糸を天秤側へ供給する上糸カセットであるので、上糸カセットから上糸を供給可能である。この上糸カセットはアーム部に着脱可能なものであり、上糸カセットを装着側へ操作するだけで、天秤の糸掛け部への糸掛けと針穴への糸通しを簡単に行うことができ、上糸カセットを介して上糸の交換も簡単に行うことができる。その他請求項1～3の何れかと同様の効果を奏する。

【0146】請求項5の発明によれば、マシンのアーム部の前面部に、前記操作体装着部としてのカセット装着部であって、上糸カセットの装着側が開放され且つ上糸カセットの着脱時に上糸カセットを直線状に案内する溝状のカセット装着部を形成したので、上糸カセットを装着する際には、カセット装着に上糸カセットを装着側から装着して直線的に移動させるという簡単な操作で装着できるし、上糸カセットを取り外す際に直線的に移動させることで取り外すことができる。その他請求項4と同

様の効果を奏する。

【0147】請求項6の発明によれば、カセット装着部の一部に天秤の糸掛け部が上下動する天秤移動領域を設け、カセット装着部の他の一部に突出する糸調子器を設け、上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を少なくとも天秤と糸調子器に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したので、天秤と糸調子器への糸掛けと、針穴への糸通しを簡単に能率的に行うことができる。その他請求項5と同様の効果を奏する。

【0148】請求項7の発明によれば、カセット装着部に突出するように糸調子皿と糸調子バネとを含む糸調子器を設け、上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を天秤の糸掛け部と糸調子皿と糸調子バネとに糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したので、糸カセット内の上糸を天秤の糸掛け部と糸調子皿と糸調子バネとに自動的に糸掛けすることができ、自動糸通し機構を介して上糸を針穴に自動的に糸通しすることができ、上糸交換時の糸掛けと糸通しの作業能率を高めることができる。その他請求項6と同様の効果を奏する。

【0149】請求項8の発明によれば、上糸カセットをカセット装着部に途中の位置まで装着した状態で自動糸通し機構に手動にて上糸を掛け、その後の上糸カセットの装着動作により自動糸通し機構を作動させるように構成したので、上糸カセットをカセット装着部に途中の位置まで装着して、上糸カセットから手を離し得る状態になった状態で、自動糸通し機構に手動にて上糸を掛けることができ、その後の上糸カセットの装着動作により自動糸通し機構を作動させて糸通しを行うことができる。請求項5～8の何れかと同様の効果を奏する。

【0150】請求項9の発明によれば、可動操作体の作動を自動糸通し機構に伝達する伝達機構は、針棒又は針棒に固定された係合片との係合により解除作動する係合機構が設けられているため、停止状態の針棒の高さ位置に合わせて係合機構を解除作動させることができるから、針棒の高さ位置に応じて針穴の高さ位置がずれていても、確実に糸通しを行ってから解除作動させることができる。請求項1～8の何れかと同様の効果を奏する。

【0151】請求項10の発明によれば、少なくとも針棒の作動位置を検出する検出手段を設け、この検出手段の検出信号を受け、針棒が所定位置にある場合だけ、可動操作体を移動可能に構成したので、針棒が所定位置にあつて針穴の高さ位置が一定の高さ位置にある場合だけ、可動操作体を移動させて自動糸通し機構を作動させ、糸通しを円滑に行うことができ、針棒の高さ位置のズレに起因する糸通しミスを防止し、自動糸通し機構の破損を確実に防止することができる。その他請求項1～9の何れかと同様の効果を奏する。

【図面の簡単な説明】

【図1】本発明の実施形態の電子制御式ミシンと上糸カセットの正面図である。

【図2】上糸カセットを取外した状態のミシンの平面図である。

【図3】カセット装着部付近の内部構造を示す縦断面図である。

【図4】カセット装着部付近の内部構造等を示す平面断面図である。

【図5】針棒上下動機構と自動糸通し機構などの正面図である。

【図6】糸通し直前状態を示す図5相当図である。

【図7】針棒とストッパーとの関係を示す図5相当図である。

【図8】針棒の適正高さ範囲を説明する図5相当図である。

【図9】(a)は糸通しフックによる糸通し直前状態を示す斜視図、(b)は糸通し直後状態を示す斜視図、(c)は糸通し後に糸通しフックが上昇した状態の要部断面図である。

【図10】糸通しスライダ作動機構と上糸カセットなどの縦断側面図である。

【図11】天秤機構とカセット装着部を示す要部縦断側面図である。

【図12】天秤の糸掛け部の移動範囲を示す要部縦断側面図である。

【図13】糸掛け部への糸掛け可能範囲を示す図12相当図である。

【図14】上糸カセット(装着直前状態)とカセット装着部の正面図である。

【図15】上糸カセット(装着途中状態)とカセット装着部の正面図である。

【図16】上糸カセット(装着途中状態)とカセット装着部などの縦断側面図である。

【図17】上糸カセット(装着完了直前状態)とアーム頭部の正面図である。

【図18】第2挟持部とカムの部分拡大断面図である。

【図19】上糸カセット(装着完了状態)とアーム頭部の正面図である。

【図20】第2挟持部(開放状態)とカムを示す図18相当図である。

【図21】カセット装着部に装着された上糸カセットの横断面図である。

【図22】上糸カセット(装着完了状態)とカセット装着部などの縦断側面図である。

【図23】上糸カセット(開閉蓋開状態)の正面図である。

【図24】上糸カセットの縦断側面図である。

【図25】上糸カセットの平面図である。

【図26】上糸カセットの底面図である。

【図27】糸経路の下流側部分を示す上糸カセットの部分切欠き横断平面図である。

【図28】カセット本体と糸駒(装着前状態)の縦断側面図である。

【図29】カセット本体と糸駒(装着後状態)の縦断側面図である。

【図30】上糸カセット(開閉蓋開状態)の正面図である。

【図31】上糸カセット(開閉蓋開状態)の底面図である。

【図32】第1案内内部を示すカセット本体の平面図である。

【図33】第2、第3案内内部と第2挟持部を示す上糸カセットの底面図である。

【図34】第2、第3案内内部と第2挟持部を示すカセット本体の横断面図である。

【図35】糸止めの手順を説明する上糸カセットの正面図である。

【図36】糸止め部等を示す上糸カセットの側面図である。

【図37】押え上げレバーと糸調子器と連動機構などの正面図である。

【図38】押え上げレバーと糸調子器と連動機構などの側面図である。

【図39】押え上げレバーと糸調子器と連動機構などの平面図である。

【図40】上糸カセット装着時の状態を示す図37相当図である。

【図41】上糸カセット装着時の状態を示す図38相当図である。

【図42】上糸カセット装着途中の状態を示す図39相当図である。

【図43】上糸カセット装着完了状態を示す図39相当図である。

【図44】上糸カセット装着完了状態を示す図37相当図である。

【図45】上糸カセット装着完了状態を示す図38相当図である。

【図46】上糸カセットの外部の上糸を使用して縫製する場合のミシンの正面図である。

【図47】上糸カセットの外部の上糸を使用して縫製する場合のミシンの平面図である。

【図48】2本針を適用した場合のミシンの正面図である。

【図49】ミシンの制御系の概略ブロック図である。

【図50】別実施形態の電子制御式ミシンと糸掛け用操作体の正面図である。

【図51】ミシン及び糸掛け用操作体の側面図である。

【図52】ミシンの平面図である。

【図53】操作体装着部付近の内部構造要部を示す部分

切欠き横断面図である。

【図54】操作体装着部付近と糸掛け用操作体の縦断面図である。

【図55】糸掛け用操作体の装着完了状態を示す要部横断面図である。

【図56】操作体装着部の下端部付近の要部横断面図である。

【図57】天秤機構と糸掛け部と糸掛け用操作体の関係を示す縦断面図である。

【図58】連動機構と糸調子器との関係を示す縦断面図である。

【図59】連動機構と抵抗付与部との関係を示す縦断面図である。

【図60】抵抗付与部（閉状態）の拡大断面図である。

【図61】抵抗付与部（開放状態）の拡大断面図である。

【図62】操作体装着部付近と糸掛け用操作体（装着完了状態）の図54相当図である。

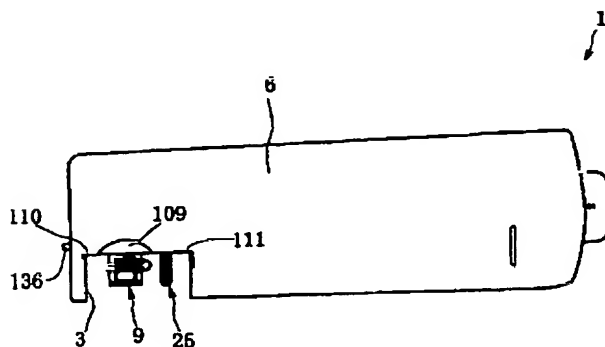
【図63】操作体装着部付近と糸掛け用操作体（装着完了状態）の図57相当図である。

【符号の説明】

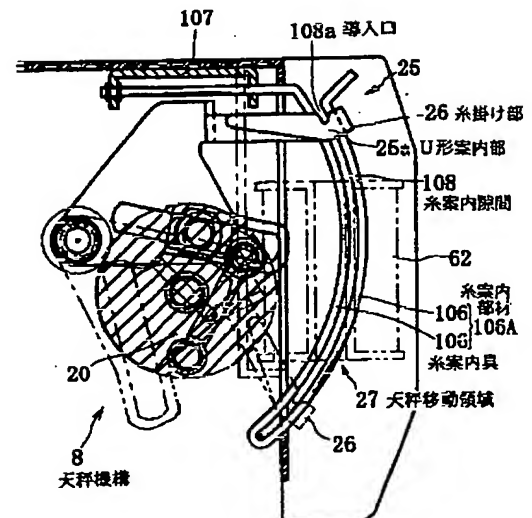
- | | |
|-------|---------|
| 1, 1A | ミシン |
| 2 | 上糸カセット |
| 3 | カセット装着部 |
| 6 | アーム部 |
| 8 | 天秤機構 |
| 9 | 糸調子器 |
| 10 | 糸通し機構 |
| 24 | 上糸 |
| 25 | 天秤 |
| 25a | U形案内内部 |

- | | |
|------|-----------|
| 26 | 糸掛け部 |
| 27 | 天秤移動領域 |
| 57 | カセットケース |
| 58 | 糸駒保持部 |
| 59 | 糸経路 |
| 62 | 糸駒 |
| 65 | 凹部 |
| 68 | 糸出口 |
| 69 | 第1案内部 |
| 70 | 第1挟持部 |
| 71 | 第2案内部 |
| 72 | 第3案内部 |
| 73 | 第2挟持部 |
| 80 | 押え板 |
| 81 | 板バネ |
| 82 | 糸より発生防止機構 |
| 84 | 案内ピン |
| 90 | 糸保持板 |
| 91 | 板バネ部材 |
| 104A | 糸止め部 |
| 106 | 糸案内具 |
| 106A | 糸案内内部材 |
| 108 | 糸案内隙間 |
| 108a | 導入口 |
| 133 | 糸調子皿 |
| 135 | 糸調子バネ |
| 200 | 操作体装着部 |
| 201 | 糸掛け用操作体 |
| 207 | 上糸操作部 |
| 208a | 糸通し作動部 |

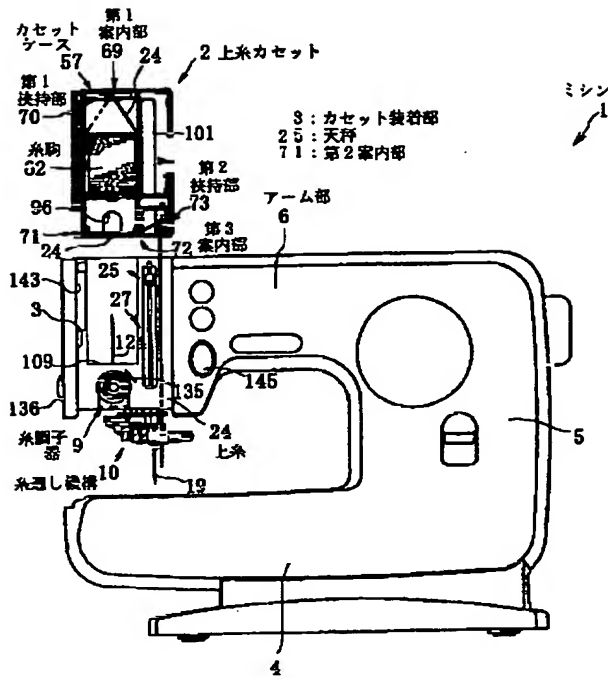
【図2】



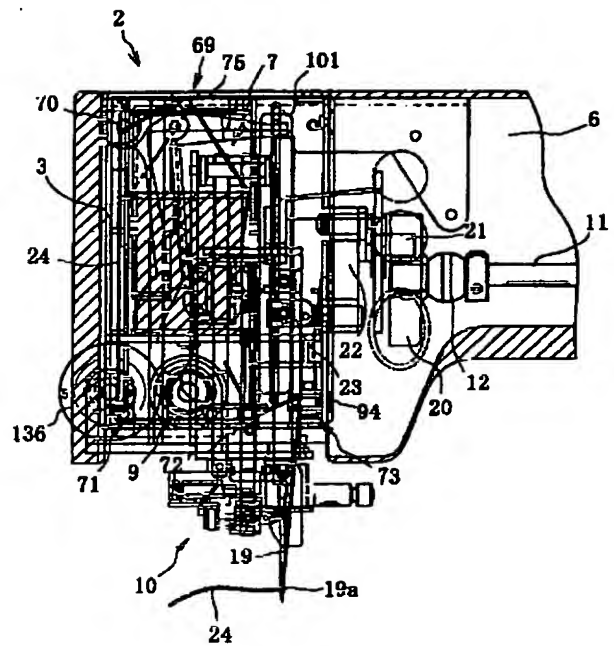
【図11】



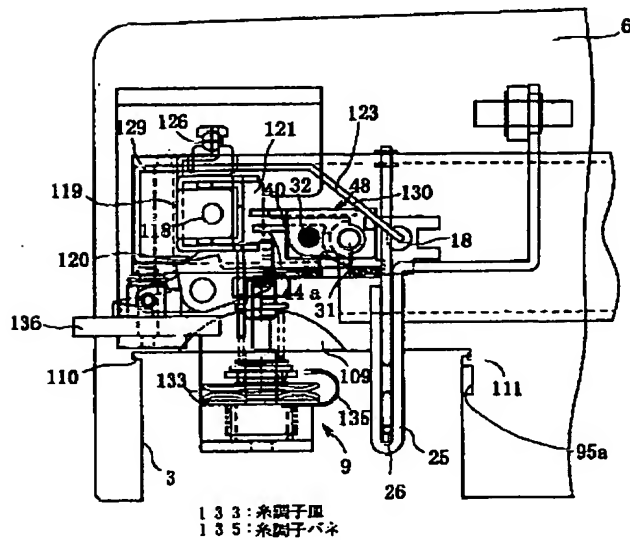
【図1】



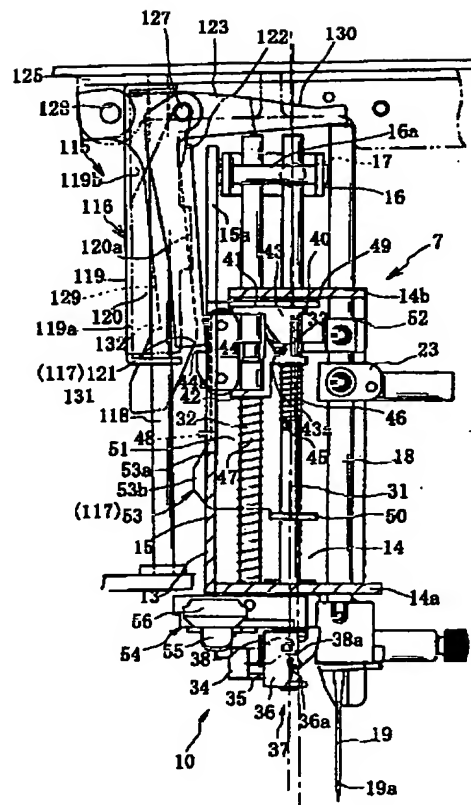
【図3】



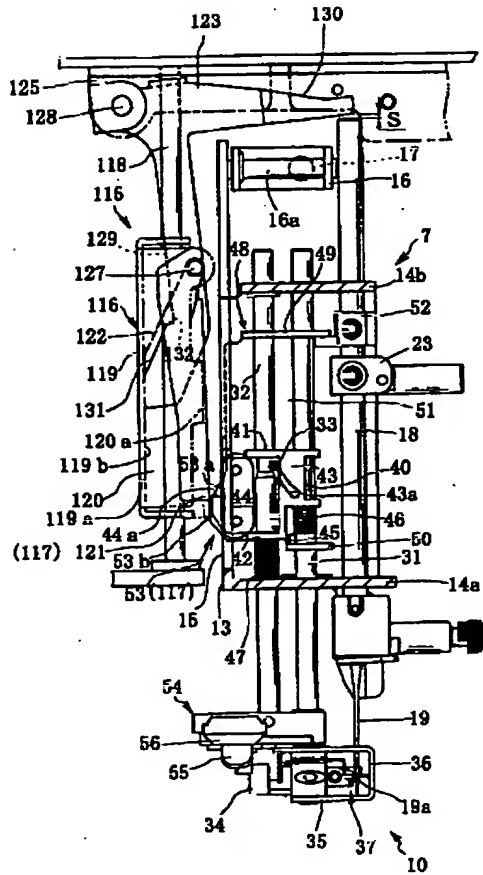
【図4】



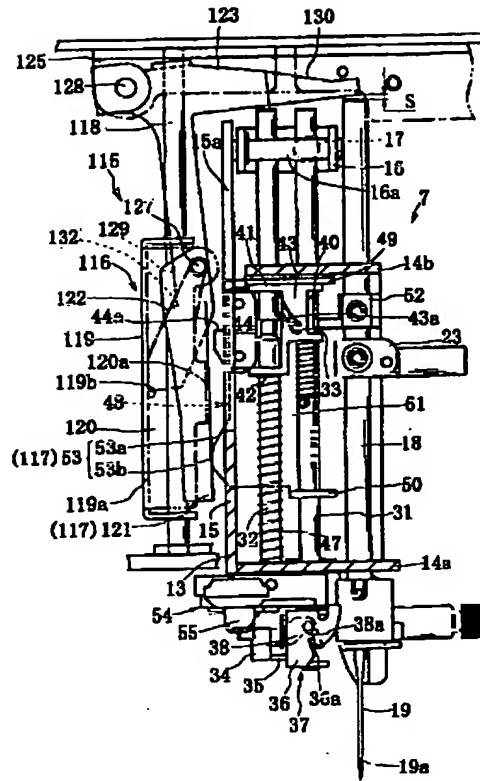
【図5】



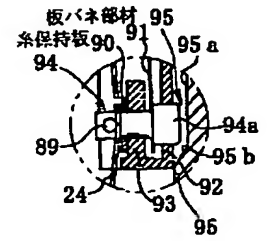
【図6】



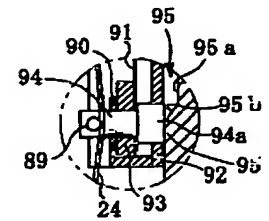
【図7】



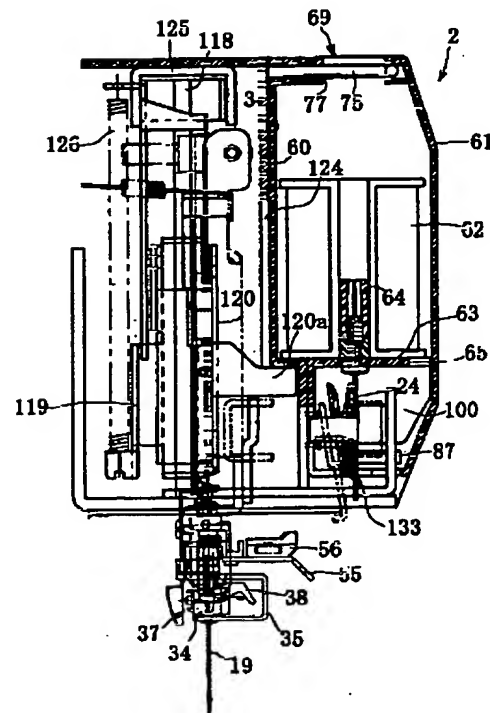
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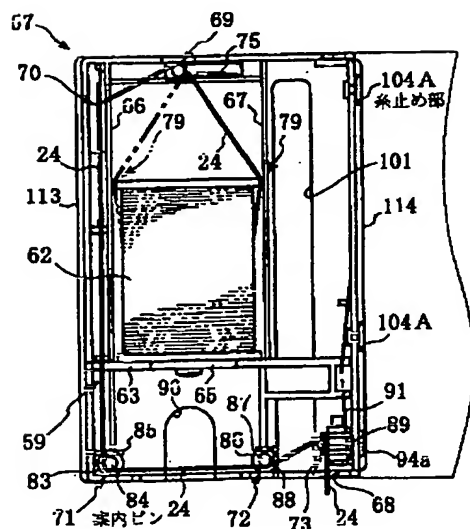
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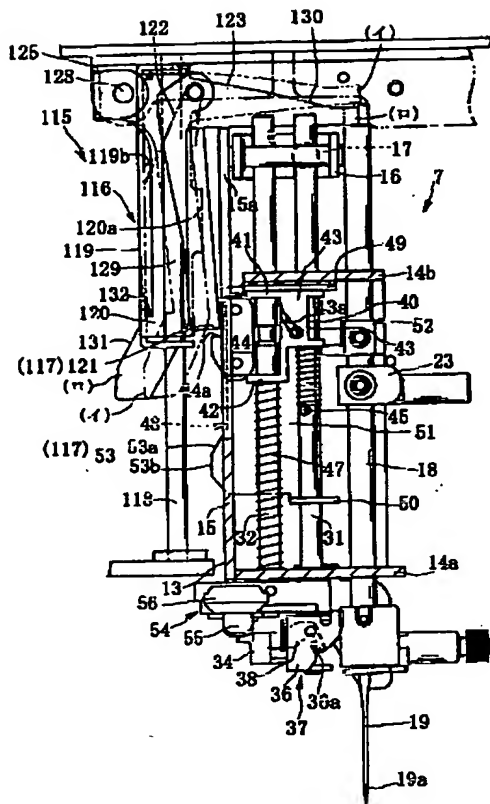
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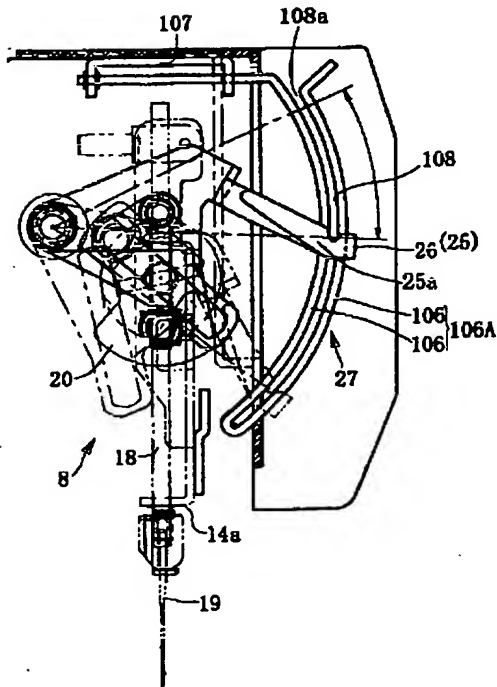
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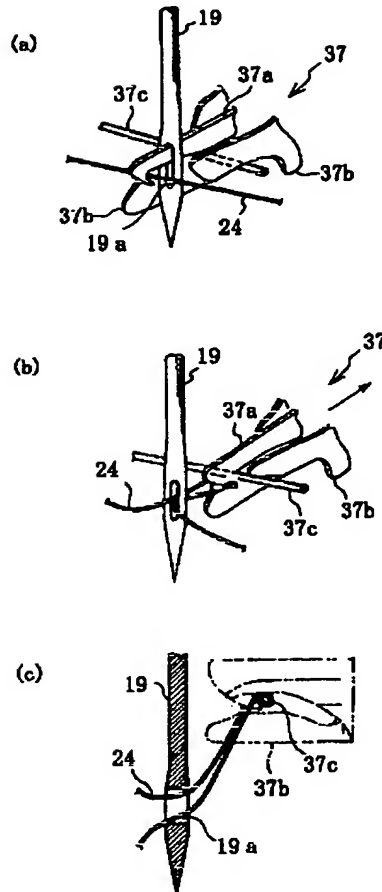
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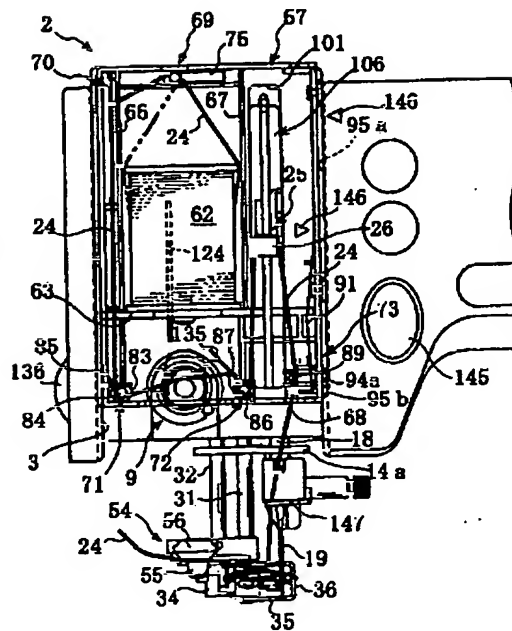
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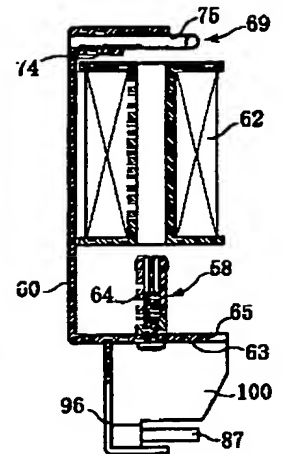
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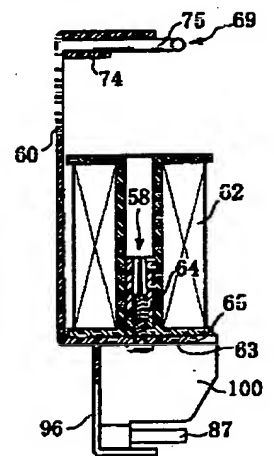
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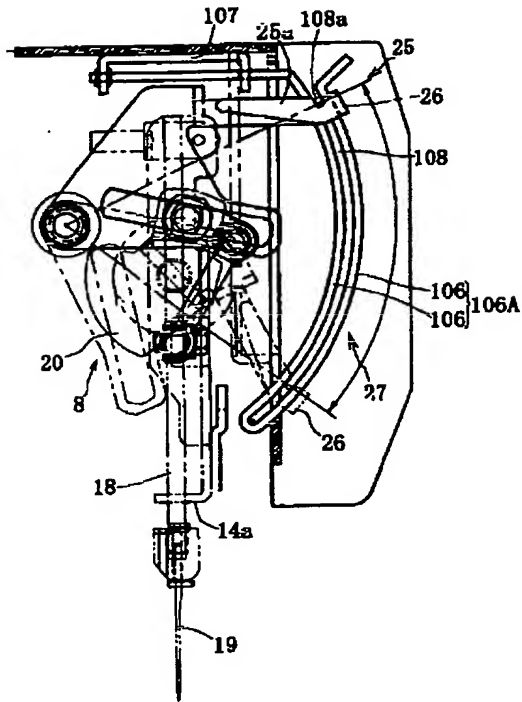
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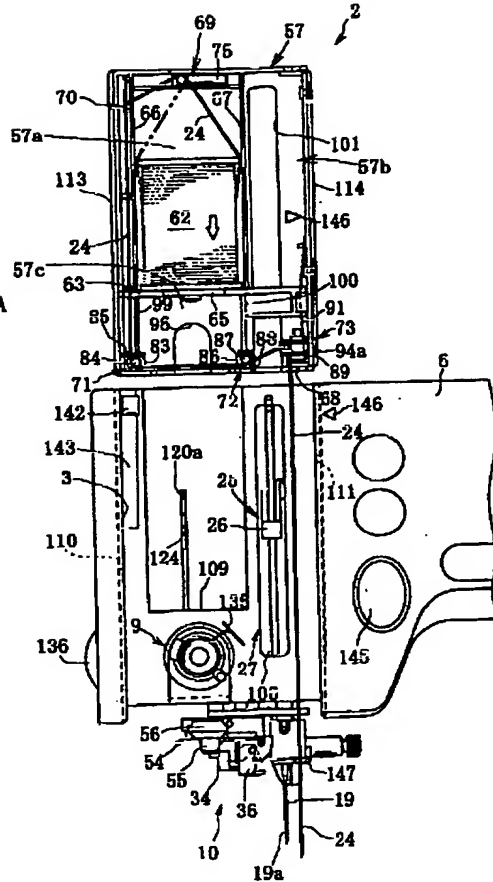
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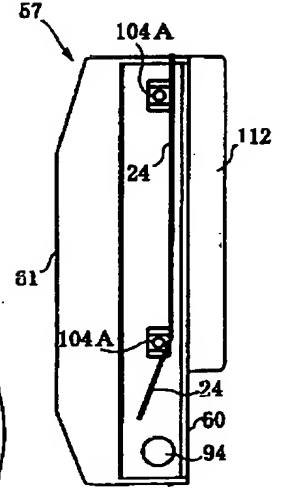
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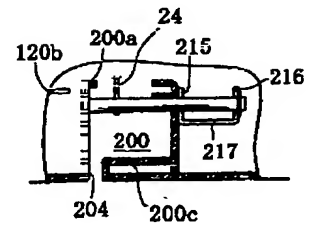
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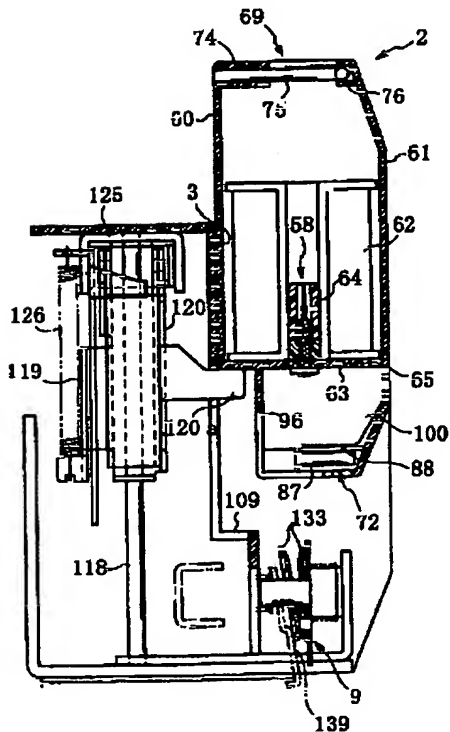
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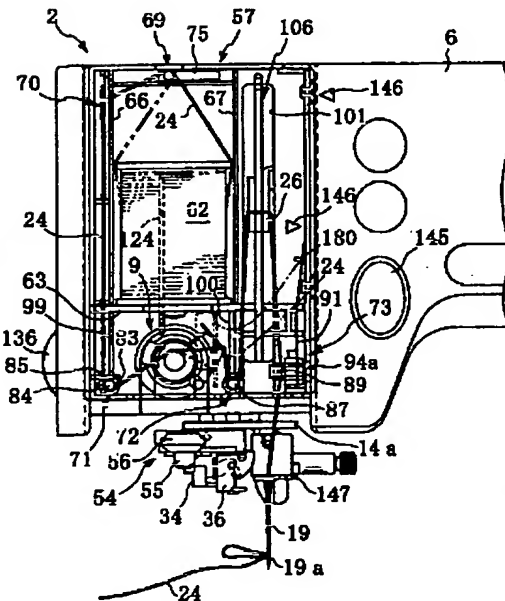
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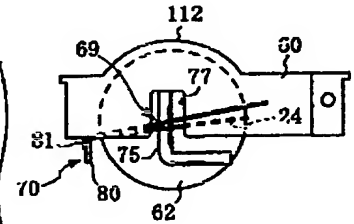
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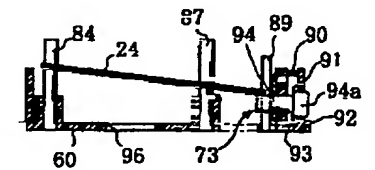
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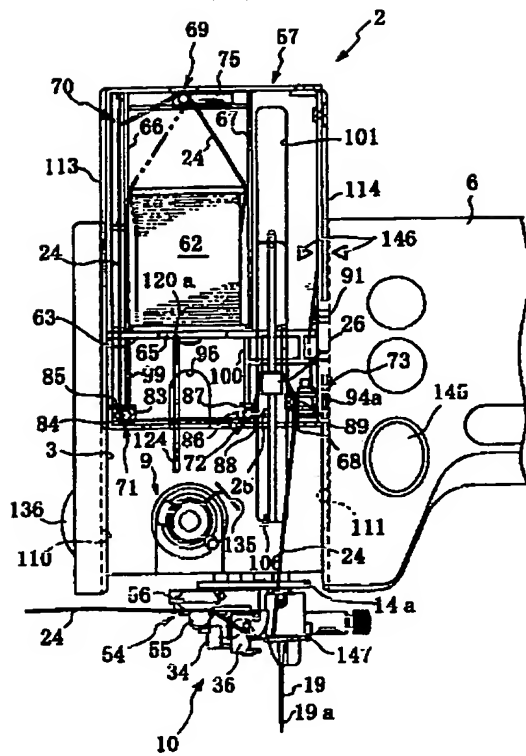
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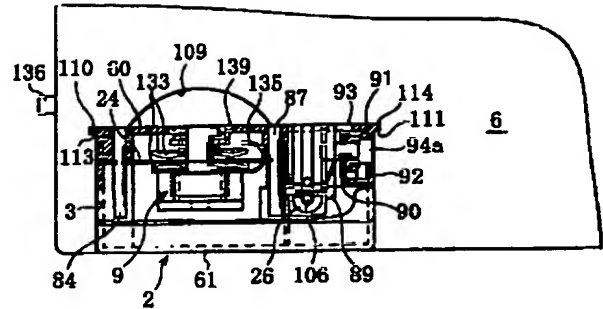
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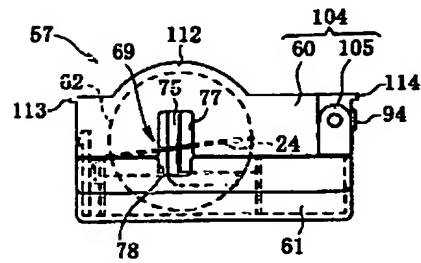
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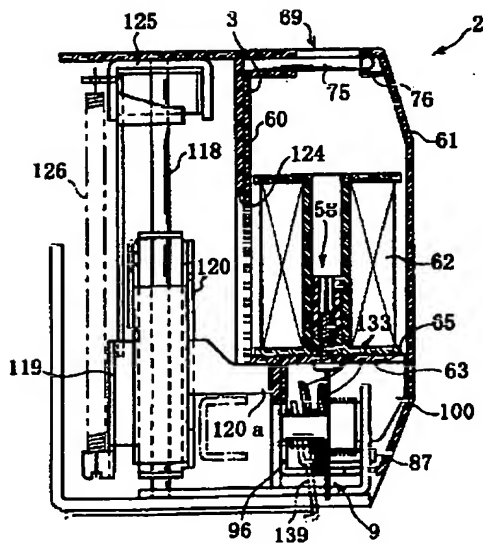
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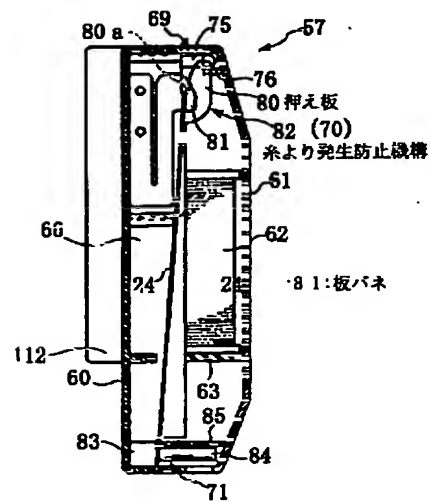
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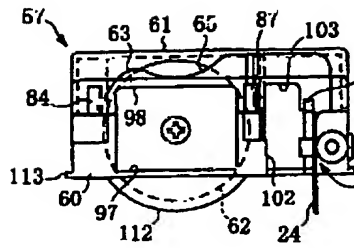
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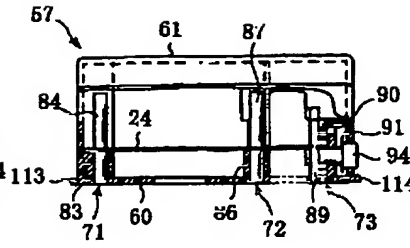
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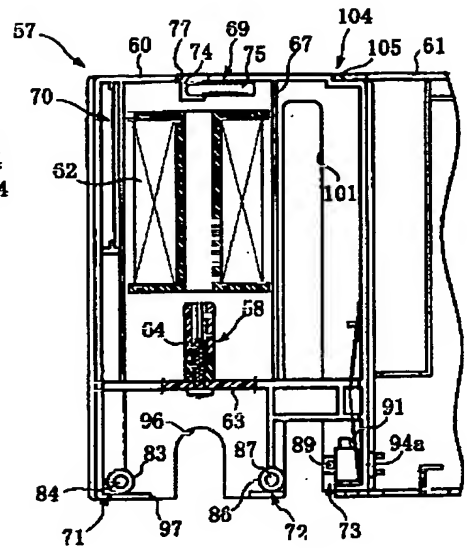
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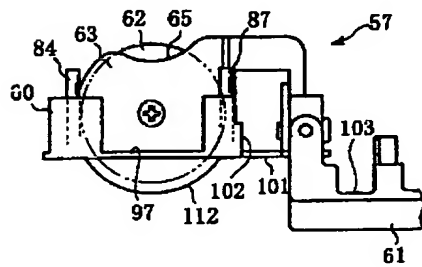
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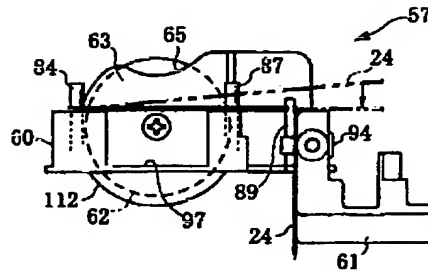
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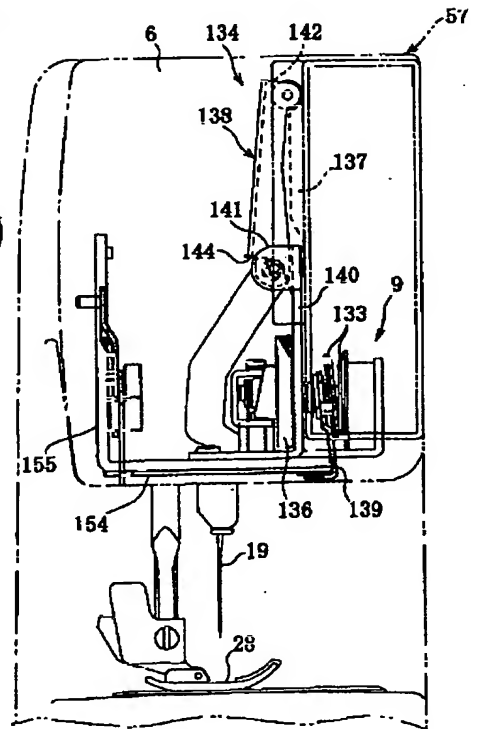
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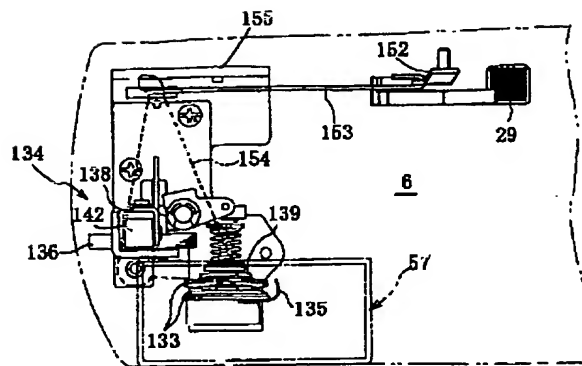
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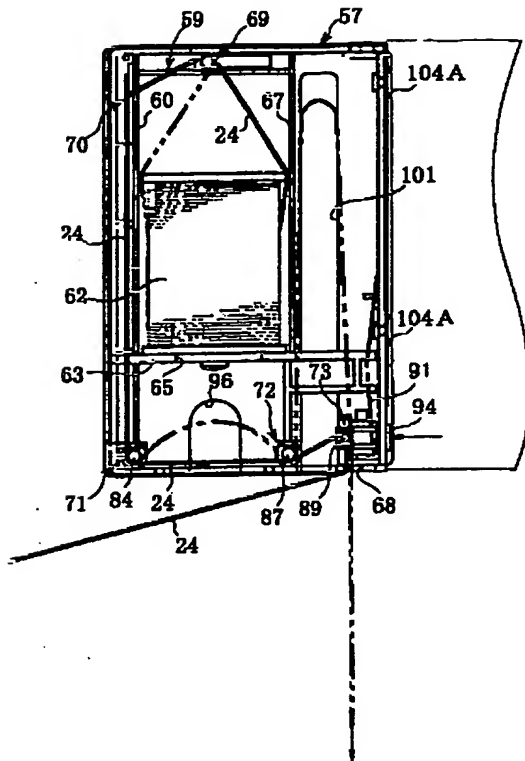
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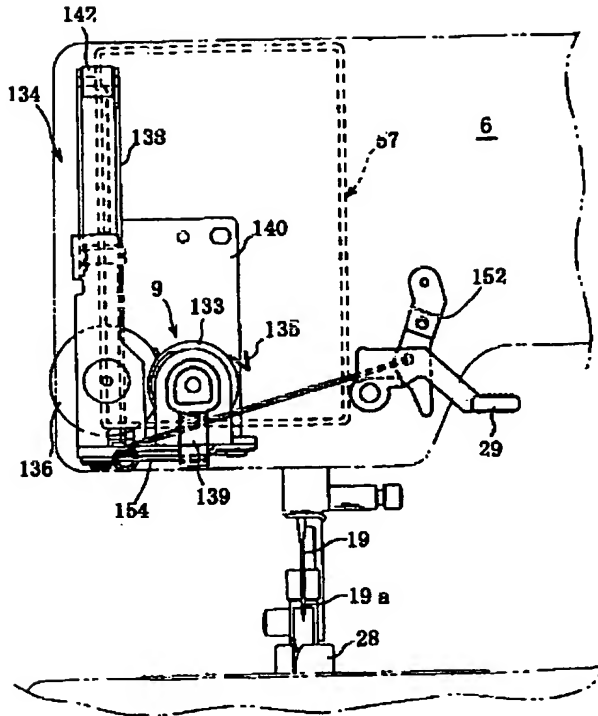
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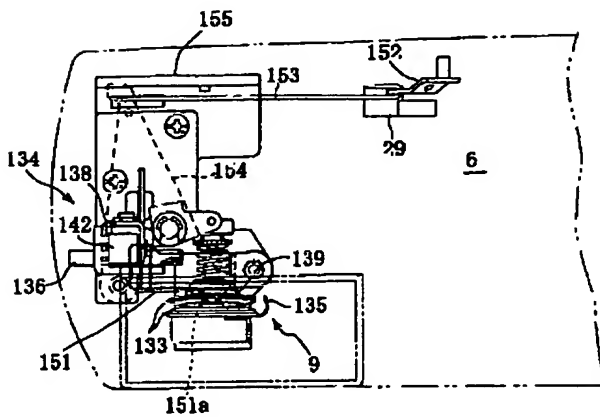
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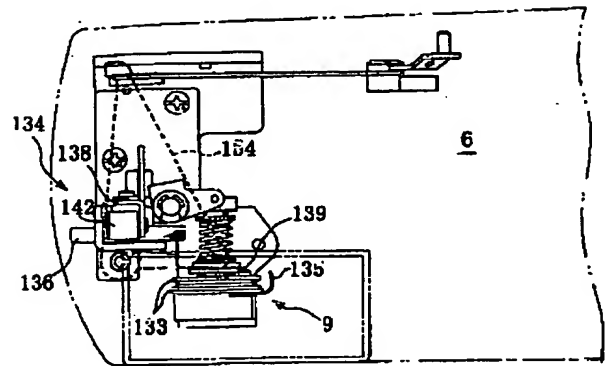
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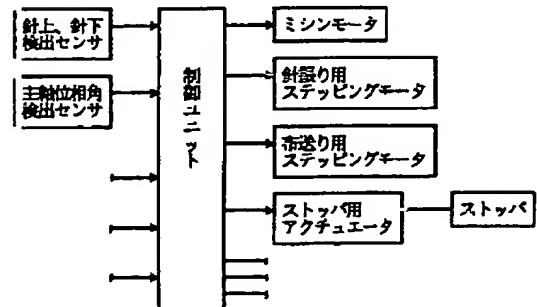
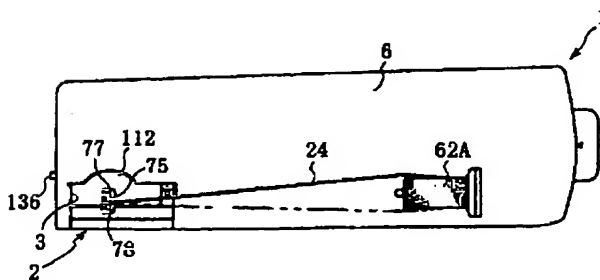
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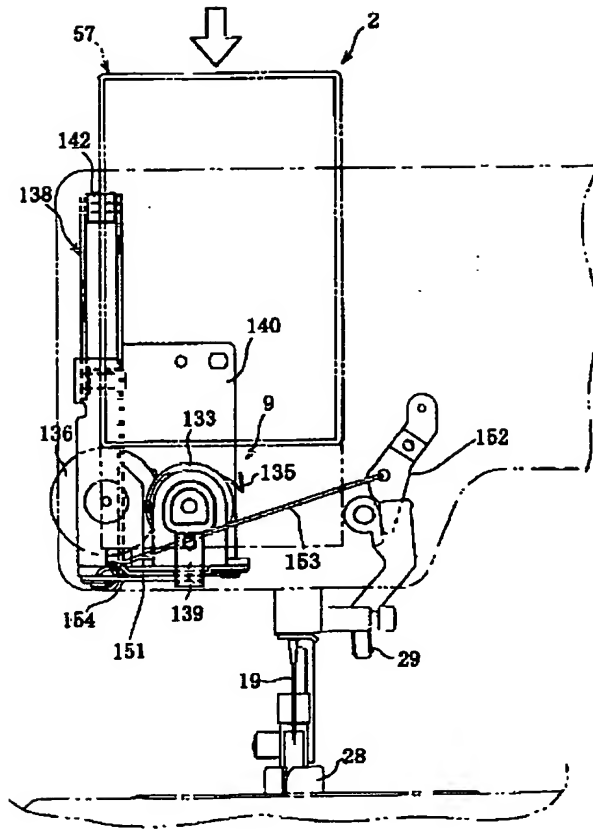
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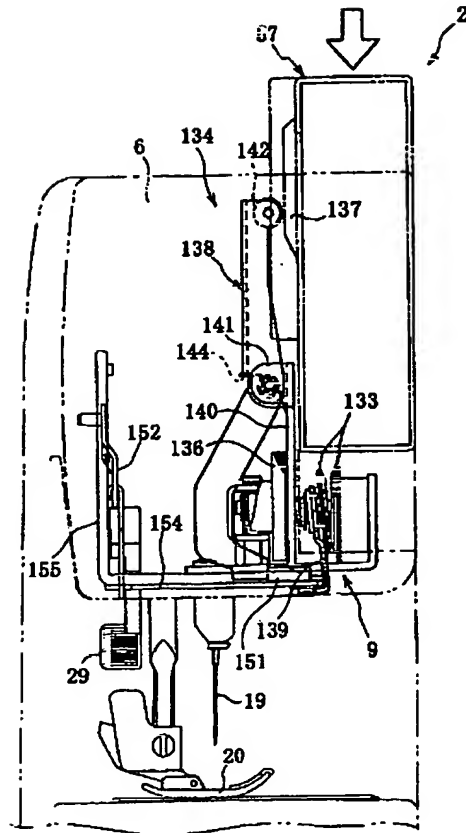
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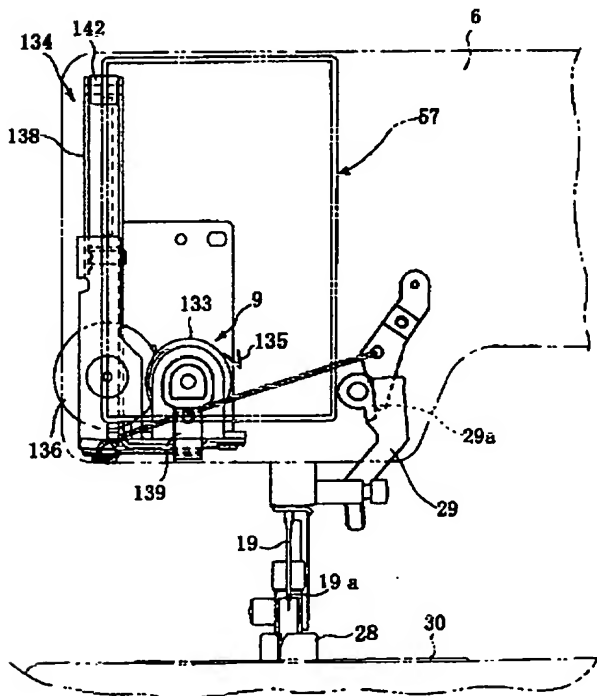
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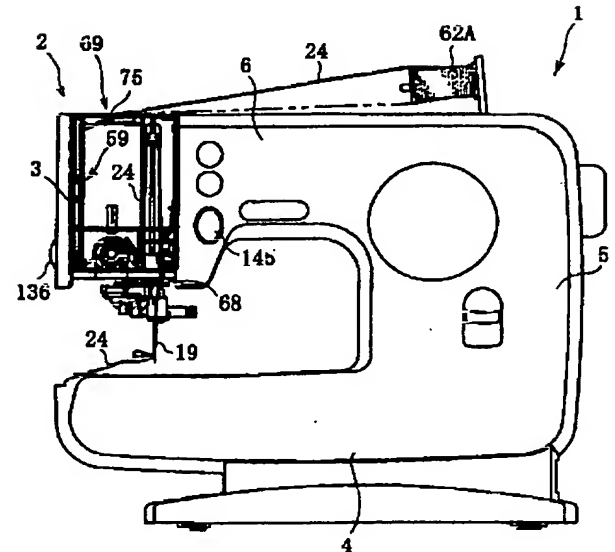
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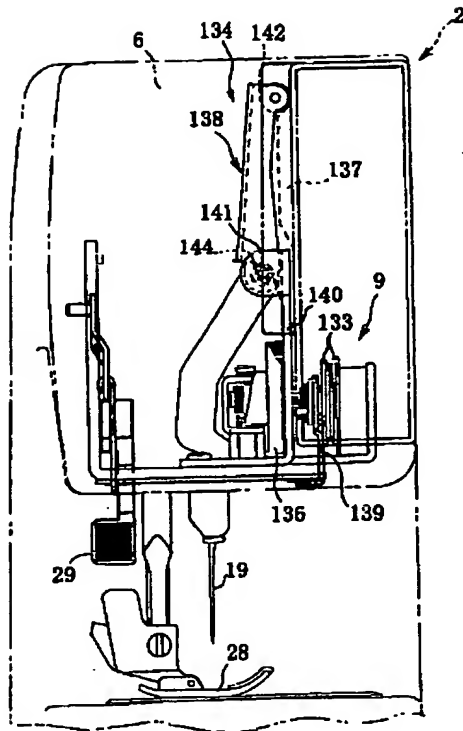
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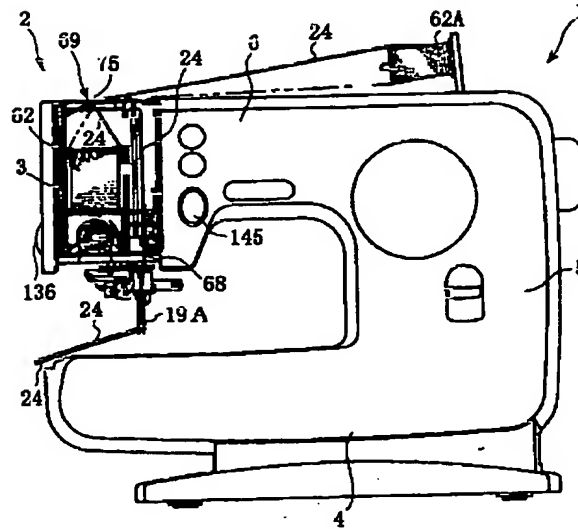
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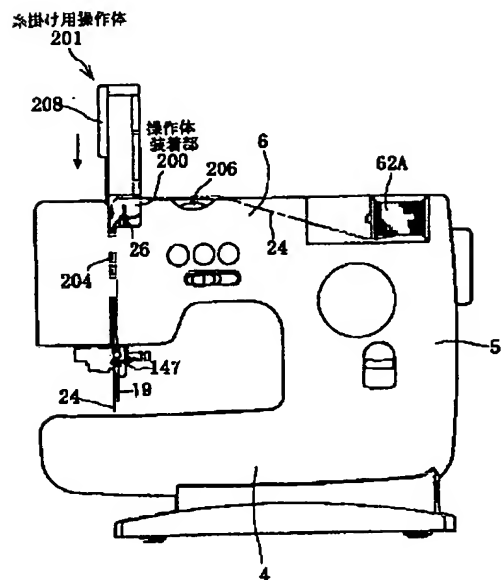
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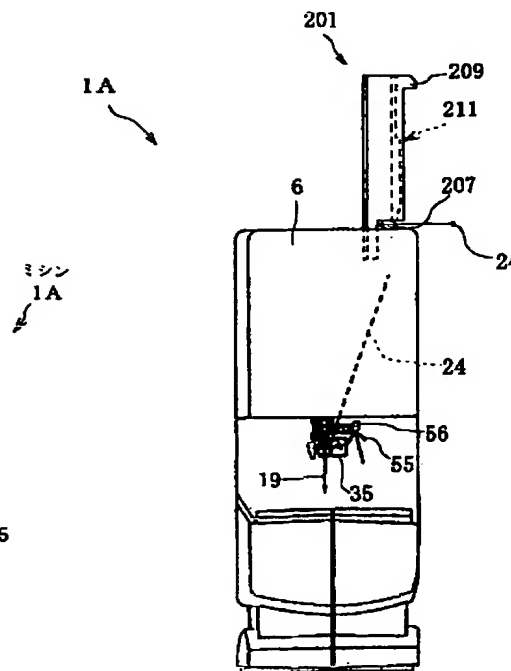
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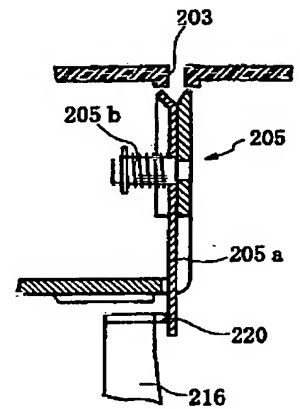
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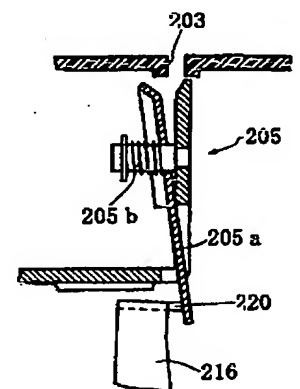
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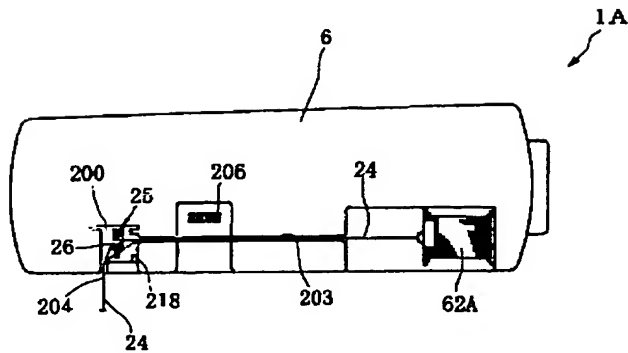
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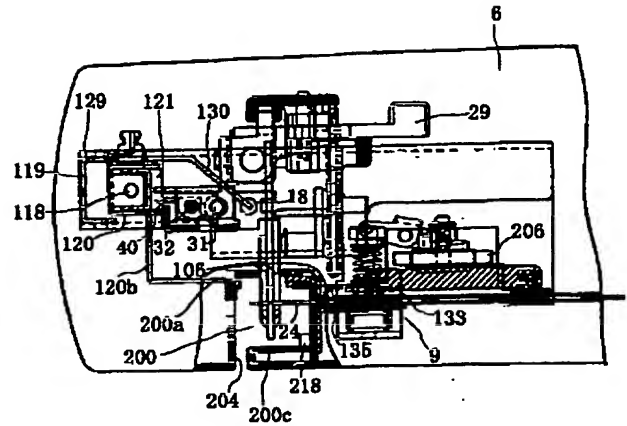
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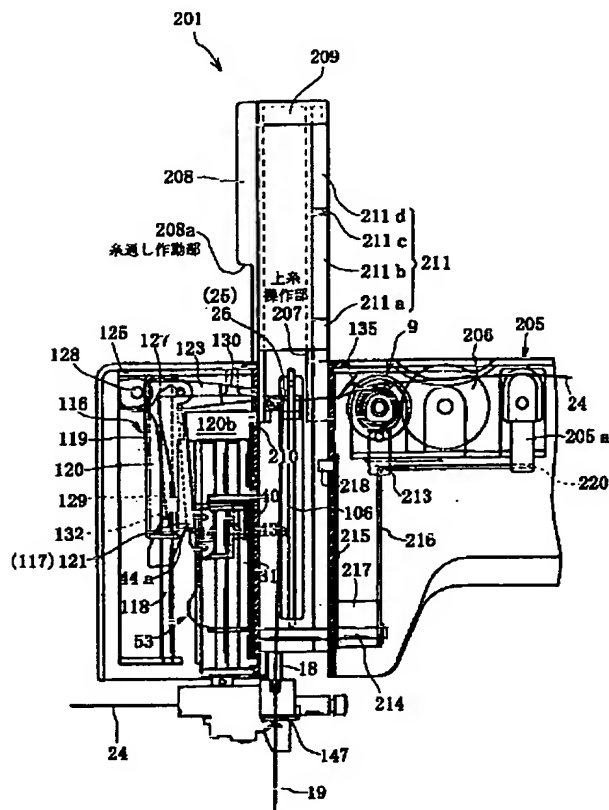
【图5 2】



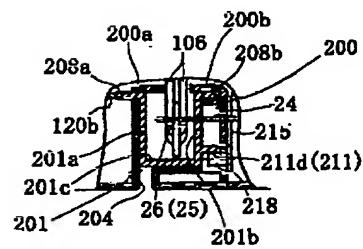
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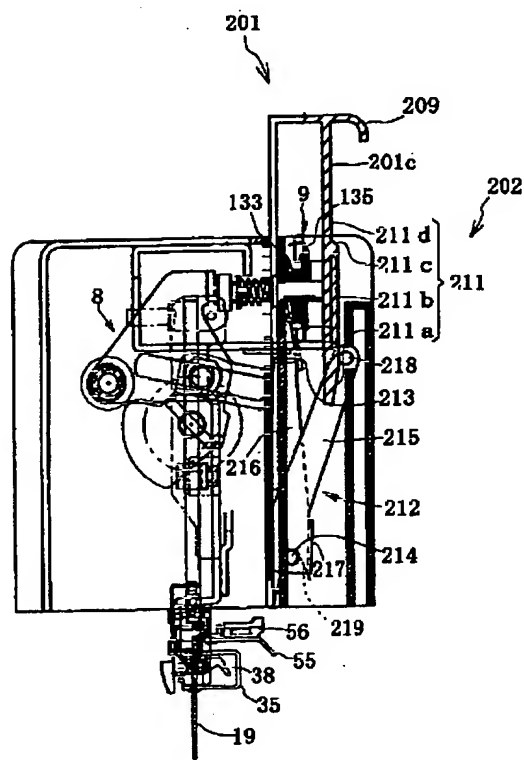
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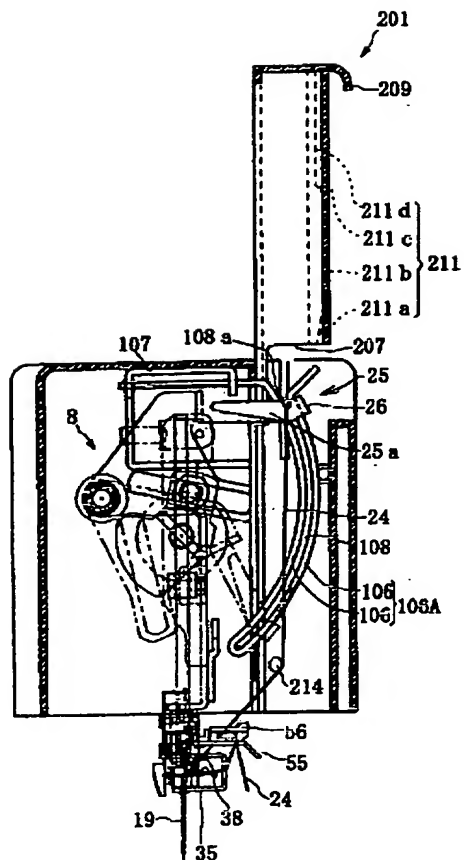
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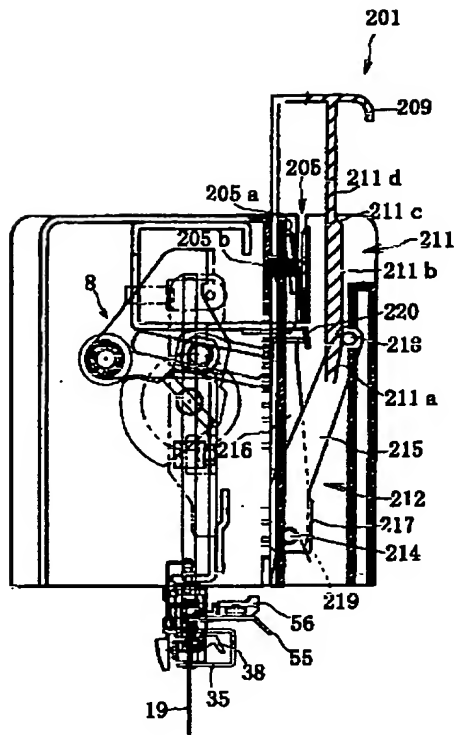
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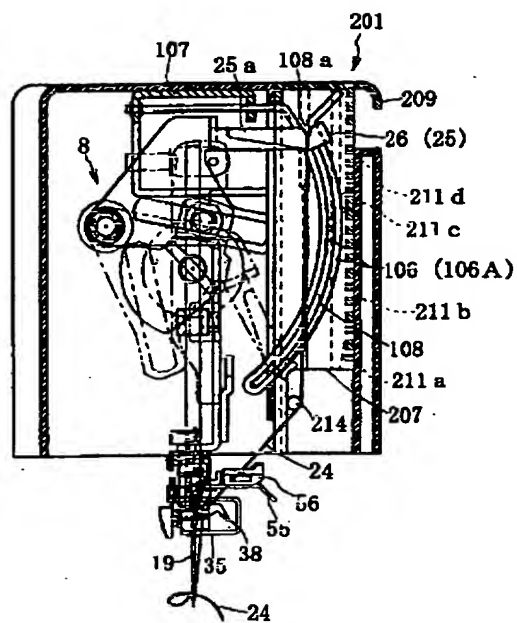
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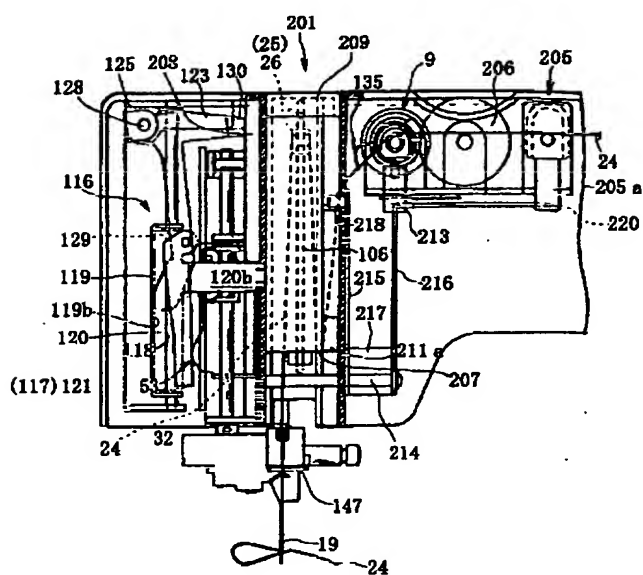
【図59】



【図63】



【図62】



PATENT ABSTRACTS OF JAPAN

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(21)Application number : 2000-398266 (71)Applicant : BROTHER IND LTD

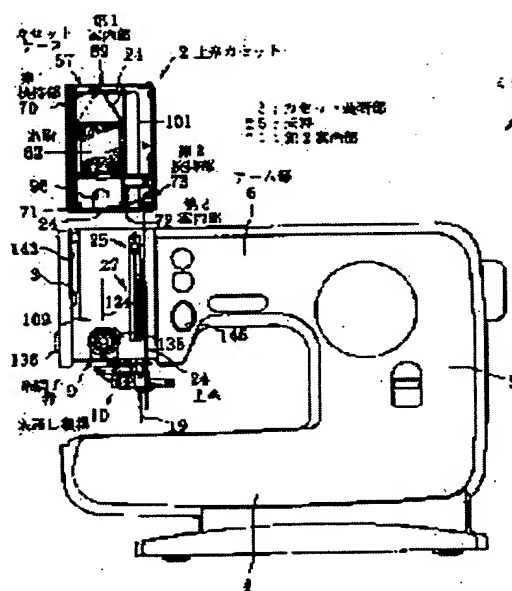
(22)Date of filing : 27.12.2000 (72)Inventor : KITAZAWA HIROSHI

(54) SEWING MACHINE

(57)Abstract:

PROBLEM TO BE SOLVED: To solve such a problem that threading linked with threading in the threading part of a thread take-up lever and a thread tension guide is impossible when an needle thread cassette is attached, since an automatic threading mechanism for threading a needle thread through the eye of a needle is constituted to operate and move a manual operation type lever and is not suitable for threading linked with another mechanism.

SOLUTION: A cassette mounting part 3 comprising a thread take-up lever movement area is formed in a vertical groove shape at the arm head part of a sewing machine and an upper thread cassette 2 vertically storing the spool 62 is constituted in the cassette mounting part 3 so as to be freely attachable/ detachable. The threading mechanism 10 is arranged in the arm head part. A thread is put through the threading part of a thread take-up lever 25 and the thread tension guide 9 linked with the mounting action of the needle thread cassette 2 and the threading mechanism 10 threads to the eye of a needle 19a.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of]

rejection]

[Kind of final disposal of application other
than the examiner's decision of rejection or
application converted registration]

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decision of rejection]

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CLAIMS

[Claim(s)]

[Claim 1] In the sewing machine equipped with the balance which takes up the needle thread which it let out from the yarn die by making it movement of a needle at the time of **, and reciprocating, and the automatic threader device which lets a needle thread pass to a pinholing While operating a needle thread and setting to the thread-guard section of a balance by preparing a movable actuation object movable at least at predetermined within the limits in the arm section of a sewing machine, and moving said movable actuation object by said predetermined within the limits The sewing machine characterized by constituting so that said automatic threader device may be operated and the threader of the needle thread may be carried out to a pinholing.

[Claim 2] Said movable actuation object is a sewing machine according to claim 1 characterized by having the needle-thread control unit which operates the needle thread in case the thread guard of the needle thread is carried out to the thread-guard section of a balance, and the threader actuation section which operates said automatic threader device in case the threader of the needle thread is carried out to a pinholing.

[Claim 3] The sewing machine according to claim 1 or 2 characterized by forming the actuation object applied part for equipping the anterior part of the arm section or the front section of said sewing machine with said movable actuation object removable.

[Claim 4] Said movable actuation object is a sewing machine given in any of claims 1-3 characterized by being the needle-thread cassette which supplies the needle thread which held the yarn die and it let out from the yarn die to a balance side they are.

[Claim 5] The sewing machine according to claim 4 which is a cassette mount as said actuation object applied part, and is characterized by forming the groove cassette mount to which a needle-thread cassette wearing-side is opened wide, and it shows a needle-thread cassette in the shape of a straight line at the time of attachment and detachment of a needle-thread cassette at the front section of the arm section of said sewing machine.

[Claim 6] The sewing machine according to claim 5 characterized by constituting so that an automatic threader device may be operated and the threader of the needle thread may be carried out to a pinholing while preparing the thread tension unit which projects in a part of other cassette mounts while preparing the balance migration field where the thread-guard section of a balance moves up and down to said a part of cassette mount, and the wearing actuation to the cassette mount of said needle-thread cassette being interlocked with and carrying out the thread guard of the needle thread in a needle-thread cassette to a balance and a thread tension unit at least.

[Claim 7] The sewing machine according to claim 6 characterized by constituting so that an automatic threader device may be operated and the threader of the needle thread may be carried out to a pinholing while the thread tension unit containing a stitch-balancing-thread-tension pan and a tension spring is prepared so that it may project in said cassette mount, and the wearing actuation to the cassette mount of said needle-thread cassette is interlocked with and carrying out the thread guard of the needle thread in a needle-thread cassette to the thread-guard section, stitch-balancing-thread-tension pan, and tension spring of a balance.

[Claim 8] A sewing machine given in any of claims 5-8 characterized by constituting so that a needle thread may be manually hung on an automatic threader device where a cassette mount is equipped with said needle-thread cassette to an intermediate location, and an automatic threader device may be

operated by wearing actuation of a subsequent needle-thread cassette they are.

[Claim 9] The transfer device in which actuation of said movable actuation object is transmitted to an automatic threader device is a sewing machine given in any of claims 1-8 characterized by establishing the engagement device which carries out discharge actuation by engagement to the piece of engagement fixed to the needle bar or the needle bar they are.

[Claim 10] A sewing machine given in any of claims 1-9 characterized by constituting said movable actuation object movable only when it has a detection means to detect the actuated position of a needle bar at least, and is examined for this detection means and a needle bar is in a predetermined location they are.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the sewing machine which equipped the arm section with the movable actuation object movable at least at predetermined within the limits.

[0002]

[Description of the Prior Art] In the usual sewing machine, the balance device and needle-bar drive which are driven with a main shaft to arm circles are arranged, and the both-way drive of the balance is partially carried out from the vertical slit of an arm head at the projection upper and lower sides. A yarn-die applied part is prepared in the upper limit side of the arm section, a thread tension unit and a tension spring are arranged in the front-face side of the arm section, and the accommodation dial of a thread tension unit is prepared near this thread tension unit. The pressure bar which supports the presser-foot guide peg which a needle bar is projected down the arm head, and a needle is attached in the lower limit section of this needle bar, and presses down the ground for sewing, and this presser-foot guide peg can be switched to the downward location which presses down the ground by the knee lifter lifting lever, and the evacuation location evacuated upwards.

[0003] When stopping sewing and exchanging the yarn die of a needle thread, a presser-foot guide peg is in an evacuation location, and the thread tension unit is in the open condition. Yarn dies are exchanged in that condition, the needle thread which it let out from this yarn die is led to a thread tension unit through two or more tension-thread-guard sections, a thread guard is carried out to a tension spring between one pair of stitch-balancing-thread-tension pans of an open condition, a thread guard is carried out to the thread-guard section of a balance, and the threader of the edge of a needle thread is carried out to the pinholing of a needle after that. Thus, in case the yarn die of a needle thread is exchanged, it is necessary to perform a thread guard in a thread tension unit, a tension spring, and the thread-guard section of a balance, and it is necessary to perform a threader to a pinholing.

[0004] So, a needle-thread cassette is constituted removable in the arm section, and the technique which enabled it to perform a thread guard simply is indicated by the U.S. Pat. No. 3,749,039 official report. method ** of right and left of the arm section of this sewing machine -- a cassette mount is mostly prepared in a center section, and it is removable about the upper part to the needle-thread cassette at this cassette mount. Said cassette mount is formed in the right-hand side of the balance migration space as for which the balance of a balance device carries out both-way migration up and down, the amount of [of a balance] tip flank rushes into the left end section of a cassette mount, and it carries out both-way migration up and down.

[0005] Said needle-thread cassette has the cassette case where a front view **** trapezoid is made, and this cassette case consists of a case body and a closing motion lid. A yarn die levels that axial center, and is held in the yarn-die hold section of the upper part within a cassette case, and it lets out the needle thread of this yarn die to the method of the right almost horizontally in predetermined length. The 1st notch for making a thread tension unit rush into the lower part of the center section of the cassette case is formed, and the 2nd notch for introducing a balance into the lower part of the left end section of a cassette case is formed.

[0006] Five tension thread guards to which it shows the needle thread which it let out from the yarn die are prepared. The 1st tension thread guard is prepared in the upper part of the right end section of

a cassette, the 2nd and 3rd tension thread guard is prepared in the location whose 1st notch is pinched, and the 4th and 5th tension thread guard is prepared in the location whose 2nd notch is pinched. The 1st resistance grant section which gives resistance to a needle thread in the condition of not equipping a cassette mount with a needle-thread cassette, and is opened after cassette wearing is prepared in the 1st tension thread guard. The 2nd resistance grant section which gives resistance to a needle thread in the state of cassette un-equipping, and is opened after cassette wearing is prepared in the 5th tension thread guard. In this 2nd resistance grant section, resistance stronger than the 1st resistance grant section is given.

[0007] In case it equips with a needle-thread cassette, the tension-thread-guard member to which a needle thread is shown and it shows the thread-guard section of a balance is prepared in the left end part of the cassette mount prepared in the arm section. This tension-thread-guard member is what really formed the arm plate of one pair of right and left, and the web, the slideway which shows the back end of one pair of arm plates to a needle thread is formed, and the notch (notch) corresponding to the thread-guard section of a balance is formed in these arm plate. Moreover, it changes into the condition of having opened one pair of stitch-balancing-thread-tension pans of a thread tension unit at the time of wearing of a needle-thread cassette, and the device which closes one pair of stitch-balancing-thread-tension pans after the completion of wearing of a needle-thread cassette is also prepared in the needle-thread cassette and the cassette mount.

[0008] In equipping a cassette mount with a needle-thread cassette, first, a main shaft is rotated by manual operation and it moves a balance to the lowest location. Next, if the cassette mount is equipped with the needle-thread cassette from the upper part, it will descend, a needle thread being guided by the tension-thread-guard member. If the thread guard of the needle thread between the 2nd and 3rd tension thread guard is automatically carried out to a thread tension unit and a tension spring, the needle thread between the 4th and 5th tension thread guard is guided by the slideway of a tension-thread-guard member, a thread guard is automatically carried out to the thread-guard section of a balance and a needle-thread cassette will be in the completion condition of wearing. The 1st and 2nd resistance grant section will be in an open condition, and a needle thread will let out from a yarn die into subsequent sewing.

[0009] On the other hand, the cassette type harness cord equipment of a sewing machine is proposed by JP,55-81693,A. With this cassette type harness cord equipment, the covering object which opens and closes the cassette mount prepared in the balance migration field and its right-hand side field of the arm section and this cassette mount is established, and a needle-thread cassette is detached and attached on this covering object. There are a thread tension unit and a thread take-up spring in a cassette mount, and there is balance migration space in a projection and the left end section of a cassette mount.

[0010] A needle-thread cassette has the bobbin object hold section, one pair of legs, etc., extends the needle thread which it let out from the core of a bobbin object between one pair of legs, and forms a free span. A covering object is closed, after rotating a covering object 90 degrees to the front, opening and setting a needle-thread cassette to this covering object. The thread guard of the free span of a needle-thread cassette is automatically carried out to a thread tension unit and a thread take-up spring in the case of the closed actuation which makes a balance the lowest location and closes a covering object. Then, if a balance is raised, a needle thread will be automatically hung on the thread-guard section of a balance. In addition, where said covering object is closed, the axial center of a bobbin has turned to the horizontal direction and the cross direction.

[0011] On the other hand, as shown, for example in JP,5-293284,A, the arm head of a sewing machine is equipped with an automatic threader device, and practical use is presented also with the sewing machine constituted from moving the control lever to a predetermined distance lower part so that the threader of the margin of string of a needle thread might be carried out to the pinholing of a needle. However, this automatic threader device is not the configuration interlocked with other devices and equipment.

[0012]

[Problem(s) to be Solved by the Invention] A thread guard can be automatically carried out to one pair of stitch-balancing-thread-tension pans and the tension spring of the thread-guard section of a balance, and a thread tension unit, equipping a cassette mount with this needle-thread cassette using

a needle-thread cassette given in said United States patent official report. However, by the sewing machine of said official report, since the automatic threader device is not equipped, wearing of a needle-thread cassette cannot be interlocked with and the threader of the margin of string of a needle thread cannot be carried out to a pinholing. Therefore, after carrying out a thread guard to the thread-guard section and the thread tension unit of a balance, it is difficult to carry out the threader of the margin of string of a needle thread to a pinholing, and to raise the working capacity of needle-thread exchange from manual operation.

[0013] And the actuation which switches the lowest location for a balance since it has the composition that a cassette mount is equipped with a needle-thread cassette, by the sewing machine of said official report after switching the lowest location for a balance by operating the main shaft of a sewing machine manually beforehand in the case of wearing of a needle-thread cassette is troublesome, and it is a pile to slight height about working capacity.

[0014] The sewing machine which an automatic threader device can be operated and can carry out the threader of the needle thread to a pinholing while the purpose of this invention is interlocked with migration of a movable actuation object and carries out a thread guard to the thread-guard section of a balance is offered, The sewing machine which an automatic threader device can be operated and can carry out the threader of the needle thread to a pinholing while wearing actuation of a needle-thread cassette is interlocked with and carrying out a thread guard to the thread-guard section of a balance is offered, While wearing actuation of a needle-thread cassette is interlocked with and carrying out a thread guard to the thread-guard section and the thread tension unit of a balance, it is offering the sewing machine which an automatic threader device's can be operated and can carry out the threader of the needle thread to a pinholing etc.

[0015]
[Means for Solving the Problem] In the sewing machine equipped with the balance which takes up the needle thread which it let out from the yarn die by making the sewing machine of claim 1 movement of a needle at the time of **, and reciprocating, and the automatic threader device which lets a needle thread pass to a pinholing While operating a needle thread and setting to the thread-guard section of a balance by preparing a movable actuation object movable at least at predetermined within the limits in the arm section of a sewing machine, and moving said movable actuation object by said predetermined within the limits It is characterized by constituting so that said automatic threader device may be operated and the threader of the needle thread may be carried out to a pinholing.

[0016] the actuation implement for a movable actuation object being the needle-thread cassette which held the yarn die of a needle thread, being the actuation implement which has not held the yarn die, and carrying out a thread guard like a needle-thread cassette -- you may be -- or the arm section -- a predetermined include angle -- it may be the rocking lever pivoted rockable and you may be a rocking lever for carrying out a thread guard like a needle-thread cassette.

[0017] A movable actuation object operates an automatic threader device, and carries out the threader of the needle thread to a pinholing while it sets a needle thread to the thread-guard section of a balance by being prepared in the arm section of a sewing machine movable by predetermined within the limits at least, and moving this movable actuation object by said predetermined within the limits. Thus, since the threader of the needle thread can be carried out to a pinholing, making it actuation of migration of a movable actuation object interlocked with, and carrying out a thread guard to the thread-guard section of a balance, the thread guard to the thread-guard section of a balance and the threader to a pinholing can simplify, and working capacity can be raised.

[0018] The sewing machine of claim 2 is characterized by equipping said movable actuation object with the needle-thread control unit which operates the needle thread in case the thread guard of the needle thread is carried out to the thread-guard section of a balance, and the threader actuation section which operates said automatic threader device in case the threader of the needle thread is carried out to a pinholing in invention of claim 1. Equipping with a movable actuation object, in case the thread guard of the needle thread is carried out to the thread-guard section of a balance, the needle-thread control unit of a movable actuation object operates a needle thread, and in case the threader of the needle thread is carried out to a pinholing, the threader actuation section of a movable actuation object operates an automatic threader device.

[0019] The sewing machine of claim 3 is characterized by forming the actuation applied part for equipping the anterior part of the arm section or the front section of said sewing machine with said movable actuation object removable in claim 1 or the sewing machine of 2. Since said actuation object applied part is formed in the anterior part of the arm section, or the front section, in becoming easy to perform attachment-and-detachment actuation of a movable actuation object, it is advantageous also in respect of hanging a needle thread on the thread-guard section and the thread tension unit of a balance which are located in the front section of the arm section.

[0020] The sewing machine of claim 4 is characterized by said movable actuation object being a needle-thread cassette which supplies the needle thread which held the yarn die and it let out from the yarn die to a balance side in invention [which / of claims 1-3]. Besides, since it is removable, a yarn die is held in this needle-thread cassette to said arm section and a yarn cassette supplies the needle thread from a yarn die to a balance side, it can perform easily the threader to the thread guard and pinholing to the thread-guard section of a balance by actuation by the side of wearing of a needle-thread cassette, and can exchange needle threads through a needle-thread cassette.

[0021] In invention of claim 4, the sewing machine of claim 5 is a cassette mount as said actuation applied part, and is characterized by forming the groove cassette mount to which a needle-thread cassette wearing-side is opened wide, and it shows a needle-thread cassette in the shape of a straight line at the time of attachment and detachment of a needle-thread cassette at the front section of the arm section of said sewing machine.

[0022] Since the cassette mount as an actuation applied part is formed in the groove to which a needle-thread cassette wearing-side is opened wide, and it shows a needle-thread cassette in the shape of a straight line at the time of attachment and detachment of a needle-thread cassette, in case it can equip by the easy actuation of equipping cassette wearing with a needle-thread cassette from a wearing side, and making it move to it linearly, in case it equips with a needle-thread cassette and a needle-thread cassette is removed, it can remove by making it move linearly.

[0023] While the sewing machine of claim 6 prepares the balance migration field where the thread-guard section of a balance moves up and down to said a part of cassette mount in invention of claim 5 Prepare the thread tension unit which projects in a part of other cassette mounts, and the wearing actuation to the cassette mount of said needle-thread cassette is interlocked with. While carrying out the thread guard of the needle thread in a needle-thread cassette to a balance and a thread tension unit at least, it is characterized by constituting so that an automatic threader device may be operated and the threader of the needle thread may be carried out to a pinholing. The wearing actuation to the cassette mount of a needle-thread cassette is interlocked with, and since an automatic threader device is operated and the threader of the needle thread is carried out to a pinholing while carrying out the thread guard of the needle thread in a needle-thread cassette to a balance and a thread tension unit at least, a balance, the thread guard to a thread tension unit, and the threader to a pinholing can be performed efficiently easily.

[0024] It is characterized by constituting so that an automatic threader device may be operated and the threader of the needle thread may be carried out to a pinholing while the sewing machine of claim 7 prepares the thread tension unit containing a stitch-balancing-thread-tension pan and a tension spring, is interlocked with the wearing actuation to the cassette mount of said needle-thread cassette in invention of claim 6 so that it may project in said cassette mount, and it carries out the thread guard of the needle thread in a needle-thread cassette to the thread-guard section, stitch-balancing-thread-tension pan, and tension spring of a balance. Therefore, the thread guard of the needle thread in a yarn cassette can be automatically carried out to the thread-guard section, stitch-balancing-thread-tension pan, and tension spring of a balance, and the threader of the needle thread can be automatically carried out to a pinholing through an automatic threader device.

[0025] In invention [which / of claims 5-8], the sewing machine of claim 8 hangs a needle thread on an automatic threader device manually, where a cassette mount is equipped with said needle-thread cassette to an intermediate location, and it is characterized by constituting so that an automatic threader device may be operated by wearing actuation of a subsequent needle-thread cassette. If a cassette mount is equipped with a needle-thread cassette to an intermediate location, since it will be in the condition that a hand can be lifted from a needle-thread cassette, a needle thread is manually hung on an automatic threader device, and an automatic threader device is operated by wearing

actuation of a subsequent needle-thread cassette.

[0026] The transfer device in which the sewing machine of claim 9 transmits actuation of said movable actuation object to an automatic threader device in invention [which / of claims 1-8] is characterized by establishing the engagement device which carries out discharge actuation by engagement to the piece of engagement fixed to the needle bar or the needle bar. Therefore, since discharge actuation of the engagement device can be carried out according to the height location of the needle bar of a idle state, even if the height location of a pinholing has shifted according to the height location of a needle bar, discharge actuation can be carried out after performing a threader certainly.

[0027] In invention [which / of claims 1-9], the sewing machine of claim 10 is characterized by constituting said movable actuation object movable, only when it has a detection means to detect the actuated position of a needle bar at least, and is examined for this detection means and a needle bar is in a predetermined location. Since the height location of a pinholing is located in a fixed height location when a needle bar is in a predetermined location, when a needle bar is in a predetermined location, in view of being suitable for equipping with a movable actuation object, operating an automatic threader device, and carrying out a threader, wearing of a movable actuation object to an actuation object applied part has been enabled.

[0028]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing. It constitutes possible [wearing of the needle-thread cassette which held the yarn die in the cassette unit section of an arm head], this electronics control type sewing machine is interlocked with the wearing actuation at the time of equipping with that needle-thread cassette 2, and it is constituted so that a threader may be performed to the pinholing of a needle, while performing a thread guard to the thread-guard section and the thread tension unit of a balance.

[0029] the beginning -- the basic structure of a sewing machine 1, and the threader device 10 -- order -- explaining -- interlock 134 for the transfer device 115 for the Gokami yarn cassette 2, a cassette mount 3, the balance device 8, and a threader, and a thread tension unit 9 It explains in order. In addition, the following explanation explains **** front and rear, right and left as front and rear, right and left from those who operate a sewing machine.

[0030] As shown in drawing 1 - drawing 3 , this electronics control type sewing machine 1 has the bed section 4, the pedestal section 5 set up by the right end section of the bed section 4, and the arm section 6 prolonged from the upper limit of the pedestal section 5 to the left. The needle-bar vertical-movement device 7, the cassette mount 3, the balance device 8, the thread tension unit 9, and the automatic threader device 10 are formed in the arm section 6. In addition, the cassette mount 3 is formed in the head (arm head) of the arm section 6. Into the arm section 6, a main shaft 11 is supported pivotable through one pair of bearing 12, and the rotation drive of the main shaft 11 is carried out with the driving force of the sewing-machine motor besides illustration.

[0031] Next, although the needle-bar vertical-movement device 7 is explained, since this device is a general structure thing, it is explained briefly. As shown in drawing 1 , drawing 3 - drawing 8 , the needle-bar base frame 13 is arranged in *****, the needle-bar base frame 13 has the posterior-wall-of-stomach section 14 and the left wall section 15 in the arm head of the arm section 6, and bottom supporter 14a and upper supporter 14b which are prolonged to the front are really formed in it at the lower limit and upper limit of the posterior-wall-of-stomach section 14, respectively. Rather than upper supporter 14b, pivotable support arm 15a prolonged up was formed in the upper limit section of the left wall section 15, and the needle bar 18 is inserted in it possible [vertical movement / a / upper supporter 14b and / bottom supporter 14].

[0032] The pivotable support metallic ornaments 16 are supported by the sewing-machine machine frame rockable through the level support shaft 17 of the cross-direction sense, in the upper limit section of pivotable support arm 15a, shank material 16a of the longitudinal-direction sense fixes, and the pivotable support metallic ornaments 16 of the shape of a plane view abbreviation KO typeface of the letter of front disconnection are connected with shank material 16a fixed at it, and it is [the needle-bar base frame 13 makes the support shaft 17 the center of oscillation, and] rockable to a longitudinal direction (the direction of a needle swing). In addition, since the device which carries out the rocking drive of the needle through the needle-bar base frame 13 with a stepping

motor is common, the explanation is omitted. A needle bar 18 is supported by upper supporter 14b and bottom supporter 14a possible [vertical movement], and the needle 19 is attached in the lower limit of a needle bar 18 removable.

[0033] As shown in drawing 3 , drawing 11 - drawing 13 , the balance crank 20 of the balance device 8 is formed in a part for the left end flank of a main shaft 11, and the needle bar crank 22 is connected with the balance crank 20 free [rotation] through the crank pin 21. A needle bar connecting bracket 23 is fixed to a step during the abbreviation for a needle bar 18, and the needle bar crank 22 is connected with the needle bar connecting bracket 23. In the case of sewing, the rotation drive of the main shaft 11 is carried out by the sewing-machine motor, and the both-way drive of the needle bar 18 is carried out up and down by the needle bar crank 22.

[0034] As shown in drawing 11 - drawing 15 , and drawing 17 , the balance device 8 equipped with the balance 25 which makes it vertical motion of a needle 19 at the time of **, and takes up a needle thread 24 is formed in the arm section 6. the thread-guard section 26 in which a thread guard is possible forms in the point of a balance 25 from the upper part -- having -- the overall height for a right end flank of a cassette mount 3 -- continuing -- the thread-guard section 26 of a balance 25 -- up and down -- a round trip -- the movable balance migration field 27 is formed. The thread tension unit 9 for giving passage resistance to a needle thread is formed so that it may project in the lower part of a cassette mount 3.

[0035] Switching operation of the thread tension unit 9 is carried out also at the time of wearing of the needle-thread cassette 2 so that switching operation may be possible for this thread tension unit 9 and it may be later mentioned by the knee lifter lifting lever 29 which makes it go up and down the presser-foot guide peg 28. In addition, in the pedestal section 5, it stands mostly, and the axis of ordinate of the sense is arranged, interlocking connection of that axis of ordinate is carried out through a gear device at a main shaft 11, and the driving force of this axis of ordinate is transmitted to the iron pot for yarn prehension in the bed section 4. Sewing is given to the processing cloth 30 like a common electronics control sewing machine by collaboration with a needle 19, the iron pot for yarn prehension, and the cloth delivery device driven with a stepping motor.

[0036] Next, the automatic threader device 10 which carries out the threader of the needle thread 24 to pinholing 19a of a needle 19 is explained with reference to drawing 5 - drawing 10 , drawing 14 , drawing 15 , drawing 17 , and drawing 19 . Upper supporter 14b of the needle-bar base frame 13, the threader shaft 31 located in the left-hand side of a needle bar 18 at bottom supporter 14a, and the slider guide shaft 32 are supported possible [vertical movement]. the upper limit section of the threader shaft 31 -- the clearance between a bracket 16 and shank material 16a -- inserting in -- **** -- the abbreviation for the threader shaft 31 -- the middle -- the sliding pin 33 which projects horizontally has fixed in the section.

[0037] In the lower limit section of the threader shaft 31, the hook attachment component 34 made of synthetic resin fixes, and the upper supporter of the side view abbreviation KO typeface-like 1st tension-thread-guard member 35 (refer to drawing 17) and the bottom supporter are supported rotatable by the threader shaft 31 corresponding to hook attachment component 34 a top and the bottom. Yarn guide 36a which engages with the connection wall 36 of the shape of a vertical which connects an upper supporter and a bottom supporter among this 1st tension-thread-guard member 35, and shows it to a needle thread 24 is formed in the shape of a notch.

[0038] Drawing 9 (a) As shown in - (c), the hook device 37 is fixed to the hook attachment component 34, and this hook device 37 consists of yarn maintenance wire 37c which penetrates horizontally threader hook 37a, guide member of two sheets 37b located in the both sides of threader hook 37a, and these threader hook 37a and guide member 37b. The hook section is formed in the point of threader hook 37a, in case it is a threader, this hook section inserts in pinholing 19a, and the needle thread 24 located just before pinholing 19a is hooked, a needle 19 being guided by said guide member 37b.

[0039] The 2nd tension-thread-guard member 38 fixes in one, crookedness formation of the section near the abbreviation tip of this 2nd tension-thread-guard member 38 is carried out caudad, and that flection is functioning on the hook attachment component 34 as tension-thread-guard section 38a. Tension-thread-guard section 38a is located in the hook device 37 and the abbreviation opposite side to the threader shaft 31, and only predetermined distance is isolating it. That is, this 2nd tension-

thread-guard member 38 and the hook device 37 hold fixed physical relationship, and are prepared in the threader shaft 31 in one.

[0040] Next, the rotation device in which only a predetermined include angle rotates the threader shaft 31 is explained. As shown in drawing 5 - drawing 8 , drawing 14 , drawing 15 , drawing 17 , and drawing 19 , the threader slider 40 made of synthetic resin is attached outside the upper limit section of the threader shaft 31 and the slider guide shaft 32 possible [vertical movement] at the tooth-back side of the needle-bar base frame 13. That is, the threader slider 40 has the upper pivotable support section 41 and the bottom pivotable support section 42, the periphery wall 43, and the threader slider pawl 44.

[0041] The upper pivotable support section 41 and the bottom pivotable support section 42 are formed so that it may be prepared covering the threader shaft 31 and the slider guide shaft 32, and the periphery wall 43 may connect these top pivotable support section 41 and the bottom pivotable support section 42 in the shape of a vertical and the abbreviation one half of the periphery of said upper limit section of the threader shaft 31 may be covered. Spiral threader slider cam section 43a is formed in this periphery wall 43. the threader slider pawl 44 connects with the left end section of the upper pivotable support section 41 and the bottom pivotable support section 42 -- having -- the left end abbreviation -- the middle -- claw part 44a is formed in the part.

[0042] the abbreviation for the threader shaft 31 -- the middle -- the sliding pin 33 of predetermined die length is fixed to the location immediately corresponding to the bottom pivotable support section 42 top in the shape of penetration among the sections, and the back side edge section of this sliding pin 33 is engaging with threader slider cam section 43a. Among the threader shafts 31, rather than the sliding pin 33, the spring receptacle pin 45 is fixed to the fixed die-length bottom in the shape of penetration, and sheathing of the compression spring 46 is carried out between the bottom pivotable support section 42 and the spring receptacle pin 45 among the threader shafts 31. Between the bottom pivotable support section 42 and bottom supporter of needle-bar base frame 13 14a, sheathing of the compression spring 47 for energizing the threader slider 40 upwards is carried out among the slider guide shafts 32.

[0043] Here, if the offset member 48 is explained, as shown in drawing 4 - drawing 8 , it is the tooth-back side of the threader slider 40, and the threader shaft 31 and the slider guide shaft 32 are equipped with the offset member 48 possible [vertical movement] in the abbreviation 3 / the 4 die-length range of the height between upper supporter 14b of the needle-bar base frame 13, and bottom supporter 14a. This offset member 48 consists of connection wall 51 grades of the shape of a vertical which connects the upper supporter 49, the bottom supporter 50, and these top supporter 49 and the bottom supporter 50. The upper supporter 49 is inserted in the threader shaft 31 and the slider guide shaft 32, and the bottom supporter 50 is inserted only in the threader shaft 31.

[0044] the needle bar connecting bracket 23 of a needle bar 18 -- immediately, up, the threader positioning member 52 as a piece of engagement is fixed, and the right end part of the upper supporter 49 of the offset member 48 is constituted from the upper part by this threader positioning member 52 possible [contact]. After the right end part of a supporter 49 has besides contacted the threader positioning member 52, a threader hook agrees in the height location of pinholing 19a of a needle 19 (refer to drawing 6). In the left end lower part of the connection wall 51, the offset member cam section 53 is formed, and this offset member cam section 53 is flat part 53b prolonged in a vertical lower part from the lower limit of ramp 53a which projects on left-hand side, and this ramp 53a, so that it goes caudad, and it has flat part 53b which projects from claw part 44a of the threader slider pawl 44 to mist or the left.

[0045] By the needle-thread cassette 2 mentioned later, if the threader slider 40 is caudad depressed from the upper limit location which resists the energization force of a compression spring 47 and is shown in drawing 5 , the threader shaft 31, the slider guide shaft 32, and the offset member 48 will follow and descend, and after the upper supporter 49 of the offset member 48 has contacted the threader positioning member 52, it will be stopped (refer to drawing 6). Since the threader slider 40 descends relatively to the threader shaft 31 and the slider guide shaft 32 at this time, the sliding pin 33 moves along with spiral threader slider cam section 43a. The threader shaft 31 rotates only a predetermined include angle in the direction of a clockwise rotation in plane view, and a threader is carried out (refer to drawing 9 (a) - (c)).

[0046] At the time of this threader, it rotates in the direction in which the hook device 37 approaches a needle 19, and said threader hook inserts in pinholing 19a. To coincidence, the 2nd tension-thread-guard member 38 rotates synchronizing with the hook device 37 in the direction of a clockwise rotation (direction which keeps away from a needle 19). On the occasion of the threader, the link mechanism 54 which rotates the 1st tension-thread-guard member 35 supported by the lower limit section of the threader shaft 31 rotatable in the direction isolated from the 2nd tension-thread-guard member 38 is also established. namely, -- the time of the standby condition before the threader shaft 31 rotates for a threader -- the 2nd tension-thread-guard member 35 -- the posture of the front sense -- it is -- tension-thread-guard section 38a of the 2nd tension-thread-guard member 38 -- yarn guide 36a of the connection wall 36 -- it is located immediately inside.

[0047] When rotating after the threader shaft 31 descends to a minimum location, while the hook device 37 and the 2nd tension-thread-guard member 38 rotate in one in the direction of a clockwise rotation in plane view, the 1st tension-thread-guard member 35 rotates in the direction of a counterclockwise rotation through a link mechanism 54. That is, the 1st tension-thread-guard member 35 carries out isolation migration from the 2nd tension-thread-guard member 38, and carries out approach migration at the hook device 37. In addition, the support plate 55 and the tension-thread-guard pan 56 which carry out low pressure pinching of the needle thread 24 are also prepared in the near [link mechanism 54] section.

[0048] Next, the needle-thread cassette 2 is explained. As shown in drawing 1 , drawing 10 , drawing 14 - drawing 36 , the needle-thread cassette 2 as a movable actuation object The cassette case 57 of a configuration near a longwise rectangular parallelepiped with small longitudinal-direction width of face, Yarn-die hold section 57a which holds a yarn die 62, and the yarn-die attaching part 58 which holds a yarn die 62 in yarn-die hold section 57a, The yarn die 62 held at the yarn-die attaching part 58, and the yarn path 59 to which it shows the needle thread 24 which it lets out from a yarn die 62 to the yarn outlet 68, The thread-guard section 26 of the balance 25 of the balance device 8 has balance migration field 57b which is the field which carries out both-way migration up and down, thread tension unit hold section 57c into which a thread tension unit 9 is made to rush. In addition, the yarn outlet 68 is formed in the section near the right end of the bottom walls of the cassette case 57.

[0049] The cassette case 57 has the body 60 of a cassette and the closing motion lid 61 made of synthetic resin, and is connected with the right end section of the body 60 of a cassette possible [closing motion of the closing motion lid 61]. However, the closing motion lid 61 may be constituted so that it may be made to slide up and down to the body 60 of a cassette and may open and close. As a thread color discernment means to identify the thread color of the needle thread 24 of a yarn die 62, the closing motion lid 61 consists of transparent ingredients, and is identifiable in the thread color of the yarn die 62 within the cassette case 57. In addition, as another thread color discernment means, the opening hole of a **** sake may be formed in the closing motion lid 61 for a yarn die 62, or the seal of the color of the needle thread 24 of a yarn die 62 and the same color may be stuck on a part of front face of the cassette case 57.

[0050] As shown in drawing 10 , drawing 16 , drawing 28 - drawing 33 , balance migration field 57b is formed in the 1/3 abbreviation part of the right-hand side within the cassette case 57. Yarn-die hold section 57a is formed in about 2/three parts of up [of the about 2-/three piece parts of the left-hand side within the cassette case 57]. Thread tension unit hold section 57c is formed in about 1/three parts of lower [of the about 2-/three piece parts of the left-hand side within the cassette case 57], and the field for the yarn path 59 is divided into the left end section within the body 60 of a cassette with bridge walls 66 and 99.

[0051] In balance migration field 57b, the longwise slit 101 for making the thread-guard section 26 of a balance 25 and the below-mentioned tension-thread-guard member 106A rush in is formed in the posterior wall of stomach of the body 60 of a cassette. In thread tension unit hold section 57c, the notch 96 for introducing a thread tension unit 9 into thread tension unit hold section 57c is formed in the posterior wall of stomach and bottom wall of the body 60 of a cassette. The bridge wall 67,100 of a vertical is formed between balance migration field 57b, yarn-die hold section 57a, and thread tension unit hold section 57c, and the level retaining wall 63 which projects to the closing motion lid 61 side is formed between yarn-die hold section 57c and thread tension unit hold section 57a.

[0052] Since the yarn-die attaching part 58 is constituted so that the axial center may be held for a yarn die 62 to the vertical sense, it can make small width of face of the longitudinal direction of the cassette case 57, and can attain the miniaturization of the cassette case 57 and a cassette mount 3. The yarn-die attaching part 58 consists of a retaining wall 63 (it is equivalent to the wall of the hold section), and a yarn-die maintenance shaft 64. It is prepared in this retaining wall 63 so that the yarn-die maintenance shaft 64 may project up. This yarn-die maintenance shaft 64 is comparatively formed in three hoop directions, elastic deformation is possible in the diameter expansion direction, and maintenance of the yarn die 62 which has the axial hole of various sizes of it is attained.

[0053] The crevice 65 for pushing a yarn die 62 from a lower part, and removing it from the yarn-die maintenance shaft 64 upwards is formed in the front end section of the part which contacts the lower limit (end of the direction of an axial center) of a yarn die 62 among retaining walls 63. Although this crevice 65 is formed in the shape of [which became depressed in the radial inside] a notch and slackens rather than the peripheral face of a yarn die 62 as for a needle thread 24, a needle thread 24 enters between a yarn die 62 and a retaining wall 63.

[0054] Next, the yarn path 59 is explained. As shown in drawing 14 R> 4, drawing 15 , drawing 17 - drawing 21 , the yarn path 59 is a needle-thread-eyellet path which leads the needle thread 24 which it let out upwards from the yarn die 62 on the basis of the sending out point 79 from the yarn die 62 held to the yarn-die attaching part 58 to the yarn outlet 68 of the cassette case 57. The yarn path 59 has the interior 69 of the 1st proposal, the 1st pinching section 70, the interior [72] 71 of the 2nd proposal and the 3rd proposal, and the 2nd pinching section 73. Where a yarn die 62 is held to the yarn-die attaching part 58, the needle thread 24 which it let out upwards is led to the yarn outlet 68 of the lower limit section near the right end of the cassette case 57 in order from a yarn die 62 via the interior 69 of the 1st proposal, the 1st pinching section 70, the interior [72] 71 of the 2nd proposal and the 3rd proposal, and the 2nd pinching section 73.

[0055] As shown in drawing 17 , drawing 19 , drawing 22 - drawing 25 , the interior 69 of the 1st proposal and the 1st pinching section 70 are formed in the upstream part of the yarn path 59. The interior 69 of the 1st proposal is established in the crowning of the cassette case 57. The interior 69 of the 1st proposal consists of rib 76 grades for thread-cast-off prevention formed in the front at the guide pins 75 and the closing motion lid 61 of the shape of plane view of L characters bent to the projection and also the method of the right from the pin supporter material 74 formed in the body 60 of a cassette, and this pin supporter material 74.

[0056] The rectangle notch-like openings 77 and 78 are formed in the body 60 of a cassette, and the top wall of the closing motion lid 61 in the shape of opposite, respectively, and installation of them is attained from the openings 77 and 78 to the interior 69 of the 1st proposal at them in the needle thread supplied from an external yarn die so that guide pins 75 may have the tension-thread-guard section which has predetermined die length in a cross direction and may make this tension-thread-guard section face outside. The needle thread 24 which it let out from the yarn die 62 is hung on the tension-thread-guard section of guide pins 75 free [migration to a cross direction], and thereby, even when the distance between a yarn die 62 and the interior 69 of the 1st proposal is not not much long, it can pull out a needle thread 24 smoothly from a yarn die 62.

[0057] the yarn boiled and twisted to a needle thread from yarn while the 1st pinching section 70 will give passage resistance to a needle thread 24 in the upstream part of the yarn path 59 as shown in drawing 23 and drawing 24 if the 1st pinching section 70 is explained -- twining -- etc. -- it is a thing for preventing generating and this 1st pinching section 70 is formed near the upper limit of the left end section within the cassette case 57. The 1st pinching section 70 consists of a generating prevention device 82 from yarn equipped with the pressure plate 80 which has tension-thread-guard section 80a, and the flat spring 81 which presses a needle thread 24 to this pressure plate 80.

[0058] The pressure plate 80 and the flat spring 81 are being fixed to the bridge wall 66 of the body 60 of a cassette. Tension-thread-guard section 80a of a pressure plate 80 is the narrow-width notch of upper part disconnection, and tension-thread-guard section 80a has projected it to the front rather than the body 60 of a cassette. the yarn boiled and twisted to a needle thread 24 from yarn by a flat spring's 81 pinching a needle thread 24 between tension-thread-guard section 80a in contact with the left lateral of tension-thread-guard section 80a, and giving passage resistance to a needle thread 24 -- twining -- etc. -- it prevents generating.

[0059] Next, as shown in drawing 14 , drawing 15 , drawing 17 - drawing 21 , drawing 26 , and drawing 27 , the 2nd, the interior 71 and 72 of the 3rd proposal, and the 2nd pinching section 73 are formed in the downstream part of the yarn path 59. The interior 71 of the 2nd proposal is in the lower limit section of the left end section within the cassette case 57, and the interior 72 of the 3rd proposal has it in the lower limit section of the boundary section of thread tension unit hold section 57c of the inside within the cassette case 57, and balance migration field 57b, and it has the 2nd pinching section 73 near the lower limit near [within the cassette case 57] the right end.

[0060] The needle thread 24 was aslant prolonged from the interior 69 of the 1st proposal to the 1st pinching section 70, was prolonged in the vertical inside [71] the 2nd proposal from this 1st pinching section 70, was horizontally prolonged inside [72] the 3rd proposal from the interior 71 of the 2nd proposal, and is prolonged from the interior 72 of the 3rd proposal in the shape of an inclination almost horizontally to the 2nd pinching section 73. Thus, the needle thread 24 is led to the condition of crossing along with the lower limit section of the cassette case 57.

[0061] The interior 71 of the 2nd proposal serves as the pin supporter 83 formed in the posterior-wall-of-stomach section of the body 60 of a cassette, and the guide pins 84 which are fixed to this pin supporter 83 and project to the front from the rib 85 for thread-cast-off prevention formed in the closing motion lid 61. The cross-direction location of a needle thread 24 is appropriately set up with the pin supporter 83 and a rib 85. The interior 72 of the 3rd proposal serves as the pin supporter 86 formed in the posterior-wall-of-stomach section of the body 60 of a cassette, and the guide pins 87 which are fixed to this pin supporter 86 and project to the front from the rib 88 for thread-cast-off prevention formed in the closing motion lid 61. The cross-direction location of needle-thread 24 ** is appropriately set up with the pin supporter 86 and a rib 88.

[0062] Next, the 2nd pinching section 73 is explained. As shown in drawing 14 , drawing 15 , drawing 17 - drawing 21 , drawing 33 - drawing 36 , the 2nd pinching section 73 gives passage resistance to a needle thread 24 in near the yarn outlet 68. Also in the condition that a cassette mount 3 is not equipped with the needle-thread cassette 2, also in the condition of not carrying out the completion of wearing, the 2nd pinching section 73 is constituted so that passage resistance stronger against a needle thread 24 than the 1st pinching section 70 may be given. Therefore, in case the thread guard of the needle thread 24 is carried out to the thread-guard section 26 and the thread tension unit 9 of a balance 25 at the time of wearing of the needle-thread cassette 2, since a needle thread 24 maintains turgescence, in being able to carry out a thread guard to the thread-guard section 26 and the thread tension unit 9 of a balance 25 certainly, on the occasion of the thread guard, it can let out a needle thread 24 for the required needle thread 24 certainly from a yarn die 62 between the interior 71 of the 2nd proposal, and the 2nd pinching section 73. That is, in case the interior 72 of the 3rd proposal and the 2nd pinching section 73 carry out a thread guard to the thread-guard section 26 of a balance 25, they consider as a function as a needle-thread control unit which operates the needle thread 24.

[0063] The 2nd pinching section 73 consists of movable shank material 94 which turned the axial center at a level with a longitudinal direction, the guide pins 89 to which it shows a needle thread 24, the yarn maintenance plate 90, the flat-spring member 91, etc. The movable shank material 94 consists of carbon button 94 for actuation of the major diameter which can appear freely frequently to the right lateral of the shank of a minor diameter, and the lower limit section of the body 60 of a cassette. The wall sections 92 and 93 near the right end of the body 60 of a cassette of the section near the lower limit are equipped with this movable shank material 94 possible [horizontal migration] to a longitudinal direction, and elastic energization is carried out by the flat-spring member 91 to the method of the right.

[0064] In the left end section of the movable shank material 94, penetration fixing of the back end section of guide pins 89 is carried out at the cross-direction sense. Between guide pins 89 and the left lateral of the wall section 93 Passage resistance is given to a needle thread 24 by pinching a needle thread 24 between the guide pins 89 and the yarn maintenance plates 90 which the yarn maintenance plate 90 holding a needle thread 24 fixed, and were energized with the movable shank material 94 between guide pins 89 to the method of the right.

[0065] As shown in drawing 14 and drawing 18 , in the condition of having removed from the cassette mount 3, the point of carbon button 94a for actuation has projected the needle-thread

cassette 2 from the right lateral of the body 60 of a cassette according to the energization force of the flat-spring member 91. Therefore, in the condition of not equipping a cassette mount 3 with the needle-thread cassette 2, when letting out a needle thread 24 from a yarn die 62, by pushing in carbon button 94a for actuation with a finger, the movable shank material 94 and guide pins 89 can be moved to a left, the 2nd pinching section 73 can be changed into an open condition, passage resistance of the 1st pinching section 70 can be resisted, and it can let out a needle thread 24. And like the after-mentioned, where the completion of wearing of the needle-thread cassette 62 is carried out at a cassette mount 3, the 2nd pinching section 73 will be in an open condition so that passage resistance may not be given to a needle thread 24.

[0066] As shown in drawing 19 and drawing 20, in order to change the 2nd pinching section 73 into an open condition also in the condition of having carried out the completion of wearing of the needle-thread cassette 2 at the cassette mount 3, the needle-thread disconnection cam 95 which changes carbon button 94a for actuation into a ** ON condition in fluting section 95a for missing carbon button 94a for actuation in the right-hand side wall of a cassette mount 3 and the completion condition of wearing of the needle-thread cassette 2 is formed. About these, it mentions later in explanation of a cassette mount 3.

[0067] Where the completion of wearing of the needle-thread cassette 2 is carried out at a cassette mount 3, although the 2nd pinching section 73 will be in an open condition, since a needle thread 24 is pinched by the thread tension unit 9 which rushes into thread tension unit hold section 57c in the needle-thread cassette 57 and passage resistance is given, the needle thread 24 between the 1st pinching section 70 and a thread tension unit 9 maintains turgescence. therefore, the yarn which looks like [the needle thread 24 of the upstream] from yarn, and is twisted to it rather than the thread tension unit 9 of the yarn path 59 -- twining -- etc. -- it does not generate in addition, the yarn which is possible, also boils equipping a thread tension unit 9 also in [yarn] this case in order that [said] the needle thread 24 between the 1st pinching section 70 and a thread tension unit 9 may maintain turgescence similarly, and is in the needle-thread cassette 2 instead of equipping the arm section 6 with said thread tension unit 9 -- twining -- etc. -- it can prevent generating.

[0068] As mentioned above, pinch a needle thread 24 in the 1st pinching section 70, and pinch between the after-mentioned stitch-balancing-thread-tension pans of a thread tension unit 9, and passage resistance is given. If a needle thread is pinched in the inlet-port part of the stitch-balancing-thread-tension pan of a thread tension unit 9 and resistance is added, when that needle thread is made into turgescence among these, since it will be strengthened in this part in the direction whose twist which it is on the structure of that yarn original becomes tight further Into the needle-thread part between said 1st pinching sections 70 and stitch-balancing-thread-tension pans of a thread tension unit 9, the yarn twist with which the twist which it is on the structure of yarn original was always strengthened further has occurred.

[0069] the place which has this needle-thread part in this condition when a needle-thread part in the meantime slackens -- bending -- a core [part / this] -- carrying out -- yarn -- the shape of a straight line, and a dumpling -- the phenomenon of twining round a ** arises. such -- if it twines and a part is guided at the stitch-balancing-thread-tension pan of a thread tension unit 9, it will be caught in the stitch-balancing-thread-tension pan, and the thread breakage, a cramp of yarn, etc. will occur. however, above by what a needle thread 24 is pinched, respectively with said 1st pinching section 70 and stitch-balancing-thread-tension pan of a thread tension unit 9, and the needle-thread part in the meantime is made into turgescence for as mentioned above -- it twines and a phenomenon does not occur. In addition, the yarn twist with which the needle-thread part which passed the stitch-balancing-thread-tension pan of a thread tension unit 9 was strengthened as mentioned above is returned.

[0070] Next, in case a cassette mount 3 is equipped with the needle-thread cassette 2, the configuration for making a thread tension unit 9 rush into thread tension unit hold section 57c within the cassette case 57 is explained. As shown in drawing 1, drawing 14, drawing 15, drawing 23, drawing 26, drawing 30 $R > 0$, and drawing 31, thread tension unit hold section 57c sets caudad, the rectangle notch-like openings 97 and 98 are formed in the bottom wall of the body 60 of a cassette, and the closing motion lid 61 in the shape of opposite, respectively, and the notch 96 of the partial ellipse configuration which stands in a row in opening 97 is formed in the posterior-wall-of-stomach

section of the body 60 of a cassette at it. A thread tension unit 9 is held in thread tension unit hold section 57c in the shape of inrush through a notch 96 and openings 97 and 98 in the case of wearing of the needle-thread cassette 2.

[0071] As shown in drawing 1 , drawing 3 , drawing 11 - drawing 15 , drawing 26 , drawing 2727 , drawing 30 , and drawing 31 , balance migration field 57b sets caudad. To the bottom wall of the body 60 of a cassette, and the closing motion lid 61 Rectangle notch-like opening 102,103 It is formed in the shape of opposite, respectively. To the posterior wall of stomach of the body 60 of a cassette Opening 102 Longwise slit 101 which stands in a row and is prolonged [to / from a lower limit / near the upper limit] It is formed. In case a cassette mount 3 is equipped with the needle-thread cassette 2, they are these openings 102,103. Slit 101 It passes and the thread-guard section 26 of a balance 25 and tension-thread-guard member 106A are introduced in the shape of inrush into the cassette case 57.

[0072] It bulges in the shape of a partial cylinder back for hold of a yarn die 62, the after-mentioned of a cassette mount 3 catches in the part corresponding to the lower limit of the partial body, and the posterior wall of stomach which faces yarn-die hold section 57a of the posterior walls of stomach of the body 60 of a cassette as shown in drawing 21 , drawing 22 , and drawing 24 is the section 109. The engagement section 112 which is engaged from the upper part and determines the height location of the needle-thread cassette 2 It is formed. In the right-and-left both ends of the posterior wall of stomach of the body 60 of a cassette, it is the below-mentioned guide slot 110,111 of a cassette mount 3. The protruding line engagement section 113,114 which can be engaged, respectively It is formed. Where a cassette mount 3 is equipped with the needle-thread cassette 2, the front face of the closing motion lid 61 is formed so that the front face of the arm section 6, the same field, nothing and the body 60 of a cassette, and the upper wall of the closing motion lid 61 may make the same field as the top face of the arm section 6 (refer to drawing 19 R> 9 and drawing 22).

[0073] next, the yarn stop section 104 of the needle-thread cassette 2 ***** -- it explains. As shown in drawing 25 , drawing 30 , drawing 35 , and drawing 36 , it is the chamfer 105 of the pivotable support section of the closing motion lid 61 among the outside sections of the cassette case 57. Where the closing motion lid 61 is closed, it is this chamfer 105. Between the touching bodies 60 of a cassette It is constituted so that it may tacking carry out of the part for the margin-of-string flank of the needle thread 24 prolonged to the exterior of the needle-thread cassette 2, and they are these chamfers 105. It is the yarn stop section 104 in some bodies 60 of a cassette. It is constituted. However, as yarn stop section 104A, as shown in drawing 35 and drawing 36 , the piece of a flat spring energized at the case side may be prepared in the outside section of the cassette case 57, and you may constitute so that it may tacking carry out of the margin-of-string part of a needle thread 24 at this piece of a flat spring.

[0074] Next, the cassette mount 3 for equipping with the needle-thread cassette 2 free [attachment and detachment] from the upper part is explained. it is shown in drawing 1 R> 1, drawing 2 , drawing 4 , and drawing 21 -- as -- the shape of a rectangle with the cassette mount 3 longwise in the front section for a tip flank (arm head) of the arm section 6 of a sewing machine at front view as an actuation object applied part -- and it is mostly formed in right and left at the rectangular-section groove of ** length. The up and down long and slender balance migration field 27 the thread-guard section 26 of a balance 25 carries out [the field] both-way migration at a part for the right end flank of a cassette mount 3 is formed, and most cassette mounts 3 except this balance migration field 27 are located in the left-hand side of the balance migration field 27.

[0075] The axial center of the yarn die 62 held to the yarn-die attaching part 58 is mostly made parallel with the both-way migration direction of the thread-guard section 26 of a balance 25, and the upper limit and lower limit of a cassette mount 3 are formed in the shape of disconnection so that it can equip with the needle-thread cassette 2 from the direction upper part of a vertical or the needle-thread cassette 2 can be removed to the vertical upper part. It is prepared near the lower limit of mist or a left-hand side part from the center of a cassette mount 3 at the condition that a thread tension unit 9 makes the axial center the cross-direction sense, and projects to the front. In the lower part of the posterior wall of stomach of a cassette mount 3, it is the engagement section 112 of the needle-thread cassette 2. It catches, the shape of a stage which positions the needle-thread cassette 57 in a predetermined height location catches, and it is the section 109. It is formed. Near the back end of

the left-hand side wall of a cassette mount 3, and a right-hand side wall, it is the engagement section 113,114 of the needle-thread cassette 2. Shown guide slot 110,111 into which it introduces respectively free [sliding] It is formed, respectively.

[0076] Next, in order to switch the 2nd pinching section 73 to an open condition, the needle-thread disconnection cam 95 prepared in the cassette mount 3 is explained. As shown in drawing 18 and drawing 20, the needle-thread disconnection cam 95 located in its aforementioned fluting section 95a and termination side is formed in the posterior part of the right-hand side wall of a cassette mount 3. Fluting section 95a is continuing from the upper limit of a cassette mount 3 to the near [a lower limit] section, and the needle-thread disconnection cam 95 is continuously projected on the left of fluting section 95a through taper section 95b to the lower limit of fluting section 95a.

[0077] Therefore, as shown in drawing 17 and drawing 18, it moves along with carbon button 94 fang-furrow section 95a for actuation which equipped the cassette mount 3 with the needle-thread cassette 2, and was projected from the right lateral of the body 60 of a cassette just before the completion of wearing. At this time, the 2nd pinching section 73 gives passage resistance to a needle thread 24. Where it equipped the cassette mount 3 with the needle-thread cassette 57 completely and wearing of the needle-thread cassette 57 is completed, the carbon button 94 for actuation will be in the condition of having been pushed in contact with the needle-thread disconnection cam 95 to the left. At this time, the 2nd pinching section 73 will be in an open condition, and passage resistance will no longer be given to a needle thread 24.

[0078] Next, the balance device 8 is explained in detail. As shown in drawing 11 - drawing 14, this balance device 8 is the thing of the characteristic structure devised so that the actuation which equips a cassette mount 3 with the needle-thread cassette 2 might be interlocked with and the thread guard of the needle thread 24 could be carried out to the thread-guard section 26. Although this balance device 8 makes the cam type balance device the example, it can apply the following configurations also like a link type balance device. This balance device 8 has tension-thread-guard member 106A which forms the yarn cage riding clearance 108 prolonged in the shape of a curve along with the overall length of the migration locus of the thread-guard section 26 of the balance 25 driven through the balance crank 20 with the driving force of a main shaft, and this balance 25, introduces a needle thread 24 into this yarn cage riding clearance 108 from the upper part, and constitutes it possible [a thread guard] in the thread-guard section 26.

[0079] one pair of tension-thread-guard implements 106 which tension-thread-guard member 106A was prolonged in the shape of a curve along with the overall length of the migration locus of the point (thread-guard section 26) of a balance 25, vacated the yarn cage riding clearance 108, and were isolated forward and backward from -- it becomes. one pair of tension-thread-guard implements 106 one line which continued in the lower limit section -- it constitutes from a member (metal or product made of synthetic resin) -- having -- tension-thread-guard implement 106 on the backside an upper limit part -- back -- level -- extending -- the top frame of a sewing-machine machine frame -- pivotable support metallic ornaments 107 It minds, and is supported free [rotation] and the lower limit section of tension-thread-guard member 106A is making the free end. Tension-thread-guard implement 106 by the side of before The upper limit section is crooked to a before side, and inlet 108a for introducing a needle thread 24 from the upper part to the yarn cage riding clearance 108 is formed. In addition, the thread-guard section 26 of tension-thread-guard member 106A and a balance 25 is projected into the cassette mount 3 from opening of the posterior wall of stomach of a cassette mount 3.

[0080] Interior of proposal 25a of U form is prepared in a part for the tip flank of a balance 25 in the plane view formed by turning up a tip side predetermined die-length part back. One pair of tension-thread-guard implements 106 When U form guidance section 25a is inserted in free [relative sliding] and U form guidance section 25a reciprocates up and down, they are one pair of tension-thread-guard implements 106. Since it shows around by U form guidance section 25a, rotating in the upper limit section, the sliding friction to U form guidance section 25a is also small, and the noise is hardly generated, either. One pair of tension-thread-guard implement 106 in U form guidance section 25a The thread-guard section 26 which has U form crevice which is the thread-guard section 26 which hangs a needle thread 24 from the upper part, and hangs a needle thread on a top face is formed in the part corresponding to between (that is, yarn cage riding clearance 108).

[0081] Therefore, when making the axial center of a yarn die 62 parallel mostly with the both-way migration direction of the thread-guard section 26 of a balance 25 and equipping with the needle-thread cassette 2 from the vertical upper part, the wearing actuation is interlocked with, and it is the yarn cage riding clearance 108 from inlet 108a automatically about the needle thread 24 between the interior 72 of the 3rd proposal of the needle-thread cassette 57, and the 2nd pinching section 73. It can introduce and can hang easily [the thread-guard section 26 of a balance 25]. in addition, tension-thread-guard member 106A -- a line -- you may constitute from not a member but metal, or plate-like part material made of synthetic resin.

[0082] next, transfer device 115 in which actuation of the needle-thread cassette 2 is transmitted to the automatic threader device 10 ***** -- it explains. As shown in drawing 5 R> 5 - drawing 8 , it is this transfer device 115. It is the threader slider operation system 116 about actuation of the needle-thread cassette 2. Engagement device 117 which carries out discharge actuation by engagement to the threader positioning member 52 while minding and transmitting to the automatic threader device 10 It is prepared. This threader slider operation system 116 Threader slider actuation member shaft 118 (henceforth a shaft 118), Threader slider actuation member 119 Threader slider actuation member lever 120 (henceforth a lever 120), It consists of a threader slider actuation pawl 121 (henceforth the actuation pawl 121), a threader slider actuation pawl spring 122 (torsion spring 122), a threader slider actuation member stopper 123, etc. (henceforth a stopper 123).

[0083] As shown in drawing 4 , drawing 5 , and drawing 10 , it sets near the cassette mount 3, and in the arm section 6, it is a shaft 118. It is supported in the direction of a vertical and is this shaft 118. Side view abbreviation KO typeface-like threader slider actuation member 119 It is supported possible [vertical movement]. threader slider actuation member 119 **** -- plane view KO typeface-like lever 120 it fixes -- having -- this lever 120 the inside of the dark room section -- the abbreviation for right end -- the middle -- it is prepared in the section so that tabular lever section 120a may project ahead. A cassette mount 3 catches from the inside of the arm section 6, and the point of lever section 120a is the section 109. It penetrates, and it is formed so that a predetermined die-length protrusion may be carried out. It catches and is the section 109. It migrates to a lower limit from a step during abbreviation, and is a slit 124. It is formed and lever section 120a is constituted possible [vertical movement] along with this slit 124.

[0084] Shaft 118 In the top plate near the upper limit, it is a bracket 125. It fixes and is a shaft 118. It is a tooth-back side and he is a stopper 123. Lever 120 It crosses and is an extension spring 126. It is infixed and a lever 120 (that is, lever section 120a) is energized up. In addition, in order to hold the completion condition of wearing of the needle-thread cassette 2 (sewing location), it is an extension spring 126. It is constituted so that the frictional resistance which acts between the yarn maintenance carbon button 94 and a cam 95 rather than the energization force may become large.

[0085] engagement device 117 ***** -- when it explains, it is shown in drawing 4 - drawing 8 -- as -- lever 120 the right end side upper part -- actuation pawl 121 It is supported pivotably. This actuation pawl 121 It is constituted rockable covering the lock location where that lower limit section can engage with claw part 44a of the threader slider pawl 44, and the discharge location where the engagement condition with claw part 44a was canceled. however, pivotable support shaft 127 **** -- the threader slider actuation member 119 and actuation pawl 121 Torsion spring 122 which acts in between sheathing is carried out -- having -- actuation pawl 121 It energizes to a lock location side.

[0086] Actuation pawl 121 It is constituted possible [contact isolation] to the offset member cam section 53, and the lower limit section is the threader slider actuation member 119. If it depresses caudad in the state of a lock location Actuation pawl 121 After the lower limit section moved to the left along with ramp 53a in contact with ramp 53a of the offset member cam section 53 and the right end part of the upper supporter 49 of the offset member 48 has contacted the threader positioning member 52 from the upper part As shown in drawing 6 , it switches to a discharge location, and it is the engagement device 117. It is constituted so that discharge actuation may be carried out. Actuation pawl 121 If it switches to a discharge location, the threader slider 40 and the offset member 48 will carry out an upper part return according to the energization force of compression springs 46 and 47 from the minimum location shown in drawing 6 .

[0087] stopper 123 ***** -- when it explains, it is shown in drawing 4 - drawing 8 -- as --

bracket 125 the left end section -- stopper shaft 128 it supports to the cross-direction sense -- having -- this stopper shaft 128 Stopper 123 of a side view abbreviation inverted-L character configuration It is supported pivotably. stopper 123 Stopper shaft 128 from -- the vertical section 129 prolonged in the abbreviation vertical lower part sense Stopper shaft 128 from -- abbreviation level facing the right -- and horizontal level 130 prolonged to the upper part location of a needle bar 18 These verticals section 129 Horizontal level 130 It has said extension spring 126 (refer to drawing 10) energized in the direction of a clockwise rotation in drawing 8 R> 8. Vertical section 129 Ramp 131 which inclines in the Hidari slanting sense, so that it goes to the lower limit section caudad It is formed.

[0088] Ramp 131 Vertical section 129 The stopper section 132 (it is equivalent to a step) is formed in the crossing left end part, and it is the threader slider actuation member 119. In the lower limit section, it is this stopper section 132. Stopper engagement section 119a which can be engaged from the upper part is formed. (The upper limit 123, i.e., the stopper, of a needle bar 18 When it is in the proper range of (**) from (**) (refer to drawing 8), it is the threader slider actuation member 119 by the needle-thread cassette 2. When moving caudad from the upper limit location shown in drawing 5, stopper engagement section 119a is a stopper 123. Ramp 131 It contacts and they are after that and a ramp 131. Guide wall 119b of the threader slider actuation member 119 slides to a left end.)

[0089] Threader slider actuation member 119 It follows on lower part migration and he is a stopper 123. Extension spring 126 Since the energization force is resisted and it rocks in the direction of a counterclockwise rotation, it is the threader slider actuation member 119. It becomes movable to the minimum location shown in drawing 6 from an upper limit location. He is a stopper 123 when there is upper limit of a needle bar 18 out of range proper. It rocks from the location (refer to drawing 8) of (**) to the circumference of a clockwise rotation further. It is the threader slider actuation member 119 in this condition. Even if you are going to make it move caudad, it is the stopper section 132. Since it receives and stopper engagement section 119a is engaged, it is the threader slider actuation member 119. It becomes unmovable and a threader is forbidden.

[0090] As shown in drawing 7, it is the threader slider actuation member 119. Guide wall 119b is a stopper 123. Ramp 131 By sliding, he is a stopper 123. Horizontal level 130 A height location is regulated and it is the upper limit and horizontal level 130 of a needle bar 18 at the time. The minute clearance S is formed in between and they are a needle bar 18 and a stopper 123. Generating of a blow sound is prevented. [location / best]

[0091] next, interlock 134 for a thread tension unit 9 and a thread tension unit 9 ***** -- it explains. Interlock 134 It sets in the middle of the wearing actuation to the cassette mount 3 of the needle-thread cassette 2, and they are one pair of stitch-balancing-thread-tension pans 133 by the needle-thread cassette 2. It is made to open wide and is the stitch-balancing-thread-tension pan 133 at the time of completion of wearing actuation. It is the device made to be closed. A thread tension unit 9 is thread tension unit hold section 57c within the cassette case 57, where a cassette mount 3 is equipped with the needle-thread cassette 2, as shown in drawing 4, drawing 10, drawing 16, drawing 37 - drawing 45. It rushes in. Thread tension units 9 are one pair of stitch-balancing-thread-tension pans 133. These stitch-balancing-thread-tension pan 133 Shank material to support, Stitch-balancing-thread-tension pan 133 on the backside Actuation plate 139 in the backside Stitch-balancing-thread-tension pan 133 on the backside Actuation plate 139 The spring member which carries out elastic energization to the front, tension spring 135 which supports a needle thread 24 elastically near the stitch-balancing-thread-tension pan 133 Stitch-balancing-thread-tension dial 136 for spring force accommodation etc. -- it is the thing of the general structure which it had.

[0092] It is an interlock 134 as shown in drawing 37 - drawing 45. The cam section 137 formed in the back side face of the needle-thread cassette 57 Cam follower member 138 of the shape of a longitudinal lever Rotation arm 151 It has. The cam section 137 like the protruding line which projects a little back in the Johan section for a left end flank among the posterior walls of stomach of the body 60 of a cassette It is formed. frame 140 which supports a thread tension unit 9 the upper part -- bracket 141 it forms -- having -- this bracket 141 **** -- cam follower member 138 the section supports free [rotation] with the water flat head pin of the longitudinal-direction sense in the middle of the die-length direction -- having -- this cam follower member 138 Torsion spring 144 In drawing 41 R> 1, it is energized in the direction of a clockwise rotation.

[0093] Cam follower member 138 In the upper limit section, it is a roller 142. It is pivoted possible [idling]. the left-hand side part of the posterior wall of stomach of a cassette mount 3 -- the cam section 137 of the needle-thread cassette 57 the slit 143 (refer to drawing 14) made to project back forms -- having -- this slit 143 from -- the cam section 137 projected back Roller 142 Contact has become possible. rotation arm 151 the pin of longitude [section / right end] -- base plate 155 it connects by pins with the inferior lamella section -- having -- a horizontal -- rotatable -- cam follower member 138 the lower limit section -- rotation arm 151 the rear face of a left end part -- contacting -- rotation arm 151 projected part 151a -- actuation plate 139 Contact has become possible.

[0094] Cam section 137 A configuration and roller 142 By setting up a location appropriately, it sets in the middle of wearing of the needle-thread cassette 57, and is the stitch-balancing-thread-tension pan 133. It is made to open and they are one pair of stitch-balancing-thread-tension pans 133. Tension spring 135 A thread guard is carried out and it is the stitch-balancing-thread-tension pan 133 at the time of the completion of wearing of the Gokami yarn cassette 57. It constitutes so that it may close. That is, when a cassette mount 3 is equipped with the needle-thread cassette 57 and the needle-thread cassette 2 reaches to the upper part predetermined distance of a thread tension unit 9, it is the cam section 137. Roller 142 It runs aground and is the cam follower member 138. In drawing 41 , it rotates counterclockwise and is the rotation arm 151. Actuation plate 139 Stitch-balancing-thread-tension pan 133 It is made to open.

[0095] When the needle-thread cassette 57 descends in the condition, the 2nd, the interior 71 of the 3rd proposal, and the needle thread 24 between 72 are one pair of stitch-balancing-thread-tension pans 133. A thread guard is carried out in between. When the Gokami yarn cassette 57 will be in the completion condition of wearing, it is the cam section 137. It becomes low and is a roller 142. Since it will not push back, it is the rotation arm 151. Return rotation is carried out to back and it is the actuation plate 139. Return migration is carried out to back and they are one pair of stitch-balancing-thread-tension pans 133. Will be closed. In addition, interlock mechanism 134 at the time of wearing of the above needle-thread cassette 57 Actuation is produced regardless of the location (a lower part rotation location or upper part rotation location) of a knee lifter lifting lever 29.

[0096] Next, they are one pair of stitch-balancing-thread-tension pans 133 by actuation of a knee lifter lifting lever 29 like the usual sewing machine. Since it is a well-known device, the device made to open is explained briefly. It is the engagement arm 152 which the upper limit section of a knee lifter lifting lever 29 was supported pivotably by the machine frame free [rotation] as shown in drawing 37 - Fig. 4545 , and engaged with cam section 29a of this knee lifter lifting lever 29. It is supported pivotably free [the rotation to a machine frame] also for the upper limit section. Engagement arm 152 Connection rod 153 Three level corner guards 154 It connects with the back end section. Three corner guards 154 Base plate 155 by the side of a machine frame It is arranged in the inferior lamella section bottom, and they are these three corner guards 154. The left end section of the front end section is the base plate 155. It is pivoted in the inferior lamella section free [rotation] by the longitudinal pin, and they are three corner guards 154. The right end section of the front end section is the actuation plate 139. It has contacted.

[0097] Therefore, when a knee lifter lifting lever 29 is in a lower part rotation location, it is the connection rod 153. Since it is not pulled to the method of the right, they are three corner guards 154. It does not rotate but is the stitch-balancing-thread-tension pan 133. The condition of having closed is held. When a knee lifter lifting lever 29 is switched to an upper part rotation location, it is the connection rod 153. Since it is pulled to the method of the right, it is three corner guard 154. It rotates and is the stitch-balancing-thread-tension pan 133. It will be in the condition of having opened.

[0098] Next, an operation of said sewing machine 1 and an operation of the needle-thread cassette 2 are explained. As shown in drawing 14 , drawing 23 - drawing 27 , in the condition of having not equipped a cassette mount 3 with the needle-thread cassette 2, the closing motion lid 61 of the needle-thread cassette 2 is opened, and the yarn-die attaching part 58 is equipped with a yarn die 62. Next, the needle thread 24 pulled out from the yarn die 62 is hung on the interior 69 of the 1st proposal, and it hangs on tension-thread-guard section 80a of the 1st pinching section 70, and presses by the flat spring 81. Next, the needle thread 24 is hung on the interior 71 and 72 of the 2nd and the

3rd proposal one by one, and it is made to pinch between the guide pins 89 of the 2nd pinching section 73, and the yarn maintenance plate 90.

[0099] Next, after resisting the energization force of the flat-spring member 91, pressing carbon button 94a for actuation with a finger and making guide pins 89 isolate from the yarn maintenance plate 90, a needle thread 24 is taken out in predetermined length to the exterior, it cancels pressing carbon button 94a for actuation after that, a needle thread 24 is pinched by that of the 2nd pinching section 73, and the closing motion lid 61 is closed. In addition, in order to make intelligible the thread-guard procedure to the needle-thread cassette 2, the order directions mark of a thread guard may be stuck near each [of the interior 69 of the 1st proposal, the 1st pinching section 70, the 2nd, the interior 71 and 72 of the 3rd proposal, and the 2nd pinching section 73], and you may constitute so that a thread guard may be carried out according to the sequence of the mark.

[0100] the abbreviation by the side of the yarn bundle which has usually stopped the needle bar 18 in the needle top location, and, on the other hand, shows the thread-guard section 26 of a balance 25 to drawing 13 when a sewing machine 1 is a sewing idle state -- the middle -- it has stopped in the location. In this condition, the cassette mount 3 is equipped with the needle-thread cassette 2 from the upper part. Since the cassette mount 3 is wide opened by both the upper part and the lower part, the needle thread 24 pulled out about 20cm from the yarn outlet 68 of the needle-thread cassette 2 hangs down to the vertical sense under the cassette mount 3. in addition, the abbreviation by the side of the yarn bundle of the above [time / of sewing initiation / the thread-guard section 26 of a balance 25] -- the middle -- after going up from a location, it will descend.

[0101] As shown in drawing 15 and drawing 16 , it sets in the middle of wearing of the needle-thread cassette 2, and it is the engagement section 112 of the needle-thread cassette 2. The needle-thread cassette 2 is made to suspend, where lever section 120a is contacted. At this time, as shown in drawing 15 , the needle thread 24 between the interior 72 of the 3rd proposal and the 2nd pinching section 73 is the yarn cage riding clearance 108. It was introduced and the thread-guard section 26 of a balance 25 will be started. In this case, since the 2nd pinching section 73 gives passage resistance stronger than the 1st pinching section 70, the initial-complement delivery of the needle thread 24 is carried out from a yarn die 62, without pulling back a needle thread 24 in a cassette 2. In addition, one pair of tally marks 146 for checking this migration halt location It is prepared in the needle-thread cassette 2 and the sewing machine 1.

[0102] Next, it is a needle bar thread guard 147 about the needle thread 24 which hung down caudad from the yarn outlet 68 of the needle-thread cassette 2. After hanging on yarn guide 36a in order and making it pinch in low pressure between a support plate 55 and the tension-thread-guard pan 56, the margin of string is cut with the thread-cutter cutting edge besides illustration. Next, as shown in drawing 17 , it is an extension spring 126 about the needle-thread cassette 2. When the energization force is resisted and it depresses caudad, actuation of the needle-thread cassette 2 is the transfer device 115. It minds, and is transmitted to the automatic threader device 10, and the threader which lets a needle thread 24 pass to pinholing 19a is performed. The engagement section 112 as the threader actuation section of the needle-thread cassette 2 Lever 120 In order to move lever section 120a at a tip below, migration of the needle-thread cassette 2 is the transfer device 115. It is transmitted. In order that the needle-thread cassette 57 may carry out lower part migration relatively to a balance 25 in parallel to this, the delivery of the needle thread 24 from a yarn die 62 is made on the relation to which the yarn path between the 3rd tension-thread-guard section 72 and the 2nd pinching section 73 becomes long.

[0103] At this time, it is an interlock 134 like previous statement. Stitch-balancing-thread-tension pan 133 of a thread tension unit 9 It is made to open wide and the 2nd, the interior 71 of the 3rd proposal, and the needle thread 24 between 72 are the stitch-balancing-thread-tension pan 133. Between and tension spring 135 A thread guard is carried out. Since the 1st pinching section 70 and the 2nd pinching section 73 have given fixed tension to the needle thread 24 between Ryobe, they are a balance 25, the stitch-balancing-thread-tension pan 133, and a tension spring 135. A needle thread 24 will start certainly. Since the 2nd pinching section 73 gives passage resistance stronger than the 1st pinching section 70 to a needle thread 24, a needle thread 24 flows backwards the 2nd pinching section 73, is not pulled back in a cassette 2, and lets out the needle thread 24 of a complement to the above thread guards certainly from a yarn die 62. and the yarn which it is alike

and is in the needle thread 24 from yarn since slack does not arise from the 1st pinching section 70 in the needle thread 24 between the 2nd pinching sections 73 -- twining -- etc. -- it is not generated [0104] In the condition (namely, condition to which it caught and the engagement section 112 engaged with the section 109 from the upper part) of having carried out the completion of wearing of the needle-thread cassette 2 at the cassette mount 3 as shown in drawing 19 and drawing 20 Interlock 134 Stitch-balancing-thread-tension pan 133 It closes and is the threader slider actuation member 119. While it had been held by the needle-thread cassette 2 in the lowest location, the threader shaft 31 and the slider guide shaft 32 return upwards, and pinholing 19a lets a needle thread 24 pass. Moreover, as shown in drawing 20, carbon button 94a for actuation is pushed by the yarn

disconnection cam 95 to a left, guide pins 89 are isolated from the yarn maintenance plate 90, and the 2nd pinching section 73 will be in an open condition, and a needle thread 24 is opened wide and it will be in a sewing possible condition.
 [0105] and the condition that wearing of the needle-thread cassette 57 was completed -- setting -- one pair of stitch-balancing-thread-tension pans 133 the yarn boiled and twisted to the needle thread 24 in the needle-thread cassette 57 from yarn in order to pinch a needle thread 24 in the 1st pinching section 70 and to give passage resistance to a needle thread 24, even when it closes and the 2nd pinching section 73 changes into an open condition -- twining -- etc. -- it is not generated Consequently, it is hard coming to generate in sewing the thread breakage of yarn depended for twining. the condition of having equipped this cassette mount 3 with the needle-thread cassette 2 -- setting -- the thread-guard section 26 of tension-thread-guard member 106A and a balance 25 -- the inside of the needle-thread cassette 57 -- a projection and the thread-guard section 26 of a balance 25 -- the inside of the needle-thread cassette 2 -- almost -- the direction of a vertical -- a round trip -- it becomes movable.

[0106] The needle-thread presser-foot member 180 (the chain line illustrates) containing the tension-thread-guard section caudad formed in the downstream of a thread tension unit in the shape of a notch is formed, and the needle thread 24 prolonged in the downstream from the thread tension unit 9 by wearing actuation to the cassette mount 3 of the needle-thread cassette 2 is depressed caudad, and you may make it arrange it here in thread tension unit hold section 57c of the body 60 of a cassette, as shown in drawing 19. In this case, the contact part to the shank material of the thread tension unit 9 of a needle thread 24 increases, a needle thread 24 stops separating suddenly, and it is a tension spring 135. The needle thread 24 to depend can take up and an amount can be made [many]. the time of removing the needle-thread cassette 2 -- a needle thread 24 -- needle-thread presser-foot member 180 from -- it can dissociate easily.

[0107] As mentioned above, where a cassette mount 3 is equipped with the needle-thread cassette 57, sewing can be performed, supplying a needle thread 24 from a yarn die 62. In order to change the thread color of a needle thread 24 or to fill up a needle thread 24, in case the needle-thread cassette 2 is demounted from a cassette mount 3, it can demount easily by pushing the lower limit of the needle-thread cassette 2 upwards with a finger.

[0108] Carbon button 94a for actuation is pushed with a finger, since a balance 25 and the slack yarn removed from the thread tension unit 9 remain after the removal and in the needle-thread cassette 2, with a change and its condition, the slack yarn in the needle-thread cassette 2 is pulled out in the open condition to the exterior, and the 2nd pinching section 73 is twisted around it at a cassette periphery, and it is the yarn stop section 104 about the margin-of-string part of a needle thread 24. Or yarn stop section 104 A It carries out [tacking]. Then, it changes into the condition of having returned the carbon button 94 for actuation and having closed the 2nd pinching section 73.

[0109] As shown in drawing 46 and drawing 47, said openings 77 and 78 Where it is also the openings 77 and 78 for installation which introduce into the interior 69 of the 1st proposal the needle thread prolonged from yarn-die 62A of the exterior of the needle-thread cassette 2 and the yarn die 62 in the needle-thread cassette 2 is removed When carrying out sewing using the needle thread 24 of the exterior of the needle-thread cassette 2, the needle thread 24 prolonged from yarn-die 62A can be led to the interior 69 of the 1st proposal from the openings 77 and 78 for installation, and it can lead to the yarn outlet 68 through the yarn path 59. For example, as shown in drawing 48, in applying 2 needle 19A as a needle, the needle thread 24 of the yarn die 62 of the needle-thread cassette 2 interior and the needle thread 24 of external yarn-die 62A are led to the yarn outlet 68 through the yarn path 59, and it becomes possible to supply two needle threads 24 to 2 needle 19A.

[0110] The sewing machine 1 and the needle-thread cassette 2 concerning this operation gestalt do the following effectiveness so.

1) The yarn die 62 was held in the needle-thread cassette 2, and since the yarn die 62 was made exchangeable by exchanging the needle-thread cassette 2, exchange of a needle thread 24 became easy. Wearing actuation of the needle-thread cassette 2 is interlocked with especially, and it is the stitch-balancing-thread-tension pan 133 of the thread-guard section 26 of a balance 25, and a thread tension unit 9. Tension spring 135 Since a thread guard is carried out automatically, actuation of a thread guard becomes very easy and it can carry out efficiently. Since wearing actuation of the needle-thread cassette 2 is interlocked with, the automatic threader device 10 is operated and a threader is automatically carried out to pinholing 29a, a threader also becomes very easy and a needle thread 24 can be exchanged efficiently quickly.

[0111] while stopping sewing and making a needle top location stop a needle bar 18 especially, in the condition of having made the location by the side of a yarn bundle stopping the thread-guard section 26 of a balance 25, without changing the location of a balance 25, it equips with the needle-thread cassette 2, and since it is alike and a thread guard can be carried out to the thread-guard section 26 and the thread tension unit 9 of a balance 25, wearing of the needle-thread cassette 2 and actuation of a thread guard can be very easy, and it can carry out efficiently. And since a cassette mount 3 can be equipped by moving the needle-thread cassette 2 linearly from the upper part, and the needle-thread cassette 2 of a wearing condition can be moved linearly upwards and it can remove, attachment-and-detachment actuation of the needle-thread cassette 2 is easy, and can exchange the needle-thread cassette 2 quickly.

[0112] Moreover, the cassette case 57 of the needle-thread cassette 2 is transparent, and since the thread color of the internal yarn die 62 is easily discriminable, it is convenient in the case of exchange of a needle thread 24, or exchange of the needle-thread cassette 2. Since the crevice 65 was formed in the retaining wall 63 which supports the yarn die 62 inside the needle-thread cassette 2, push and a yarn die 62 can be easily removed for the lower limit of a yarn die 62 from the yarn-die attaching part 58, being able to apply a finger to this crevice 65.

[0113] 2) In the needle-thread cassette 2, the axial center is made into longitude, a yarn die 62 is held, and it lets out a needle thread 24 upwards from the yarn die 62, and since it constituted so that it might lead to the yarn outlet 68 through the yarn path 59, longitudinal-direction width of face of the needle-thread cassette 2 can be made small. Or since it is a configuration as the delivery direction of the needle thread 24 from the axial center of a yarn die 62 and a yarn die 62 is mostly made parallel with the both-way migration direction of the thread-guard section 26 of a balance 25 and a cassette mount 3 is equipped with the needle-thread cassette 2, longitudinal-direction width of face of the needle-thread cassette 2 and longitudinal-direction width of face of a cassette mount 3 can be made small.

[0114] Thus, since the needle-thread cassette 2 was a small thing near a longwise rectangular parallelepiped with small longitudinal-direction width of face, it has arranged the cassette mount 3 on the both-way migration field and the part of left-hand side that is, of the thread-guard section 26 of a balance 25, and the arm head. Consequently, a cassette mount 3 can be formed in the both-way migration field of the thread-guard section 26 of a balance 25, and the field with which it laps, and it is advantageous to them in tooth space. Moreover, a cassette mount 3 can be arranged back as much as possible, without making it interfere with the internal device of the arm section 6, after this has equipped with the needle-thread cassette 2, the needle-thread cassette 2 cannot project from the front face of the arm section 6, the appearance of the arm section 6 does not fall, either, but the degree of freedom on the design of the front face of the arm section 6 can also be secured.

[0115] 3) The 1st pinching section 70 which always gives passage resistance at a needle thread 24 is formed in the upper section of the yarn path 59 in the needle-thread cassette 2, in the condition of having equipped with the needle-thread cassette 24, since the needle thread 24 between the 1st pinching section 70 and a thread tension unit 9 is maintained to turgescence, generating round which the yarn by the yarn twist twines can be prevented, and the thread breakage resulting from twining of yarn and a cramp of yarn can be prevented in sewing.

[0116] And in order that the 2nd pinching section 73 may be formed near the yarn outlet 68, passage resistance may be given to a needle thread 24 before wearing of the needle-thread cassette 2 and the

completion of wearing and the 2nd pinching section 73 may give strong passage resistance rather than the 1st pinching section 70, In case a thread guard is carried out to the thread-guard section 26 and the thread tension unit 9 of a balance 25 at the time of wearing of the needle-thread cassette 2, without a needle thread 24 letting out freely during the handling of the needle-thread cassette 2, it can let out a needle thread certainly from a yarn die 62.

[0117] And in the condition of not equipping with the needle-thread cassette 2, carbon button 94a for actuation can be operated with a finger, the 2nd pinching section 73 can be made to be able to open wide, and it can let out a needle thread 24 freely. In order to press carbon button 94a for actuation by the needle-thread disconnection cam 95 after the completion of wearing of the needle-thread cassette 2 and to switch the 2nd pinching section 73 to an open condition, into sewing, passage resistance of the 2nd pinching section 73 does not act on a needle thread 24, but the delivery of a needle thread 24 becomes smooth. Since the needle thread 24 prolonged out of the cassette case 57 can be twisted around the external surface of the cassette case 57 and the margin-of-string part can be stopped to yarn stop section 104,104A when the needle-thread cassette 2 is removed from a cassette mount 3, it is very convenient.

[0118] 4) Since the tension-thread-guard section of the guide pins 75 faced in parallel with the long and slender openings 77 and 78 and this in the interior 69 of the 1st proposal and order at the crowning of the needle-thread cassette 2 was prepared, In the ability letting out smoothly, as a needle thread 24 can move freely along with guide pins 75 and draws radii without a yarn die 62 to resistance [needle thread / 24 / the], The needle thread from the yarn die arranged to the exterior of the needle-thread cassette 2 can be introduced in the needle-thread cassette 2 from openings 77 and 78, it can lead to the yarn outlet 68 according to the yarn path 59 of the interior, and sewing can be presented. Therefore, in case it equips with 2 needles instead of a needle 19 and sewing is carried out by two needle threads, sewing of the needle thread can be supplied and carried out from the yarn die 62 in the needle-thread cassette 2, and the yarn die held to the yarn-die attaching part of the crowning of the arm section 6 besides the needle-thread cassette 2.

[0119] 5) Wearing actuation of the needle-thread cassette 2 is interlocked with, change a thread tension unit 9 into an open condition, and it is the stitch-balancing-thread-tension pan 133 after wearing of the needle-thread cassette 2. Closed interlock 134 Since it prepared, wearing actuation of the needle-thread cassette 2 can be interlocked with as mentioned above, and a thread guard can be carried out to a thread tension unit 9. In addition, since the thread tension unit 9 has been arranged to a part for the lower limit flank of a cassette mount 3, it is advantageous to the wearing actuation which equips a cassette mount 3 with the needle-thread cassette 2 from the upper part being interlocked with, and especially carrying out a thread guard to a thread tension unit 9.

[0120] 6) The balance device 8 is the thing of characteristic structure, and is suitable for wearing actuation of the needle-thread cassette 2 to be interlocked with, and carry out a thread guard to the thread-guard section 26. Namely, yarn cage riding clearance 108 of the letter of a curve prolonged along with the overall length of the migration locus of the thread-guard section 26 of a balance 25 Tension-thread-guard member 106A to form is prepared, and it is the yarn cage riding clearance 108. A needle thread 24 is introduced and it constitutes from inlet 108a of upper limit possible [a thread guard] in the thread-guard section 26. Therefore, since it was in the location which does not retreat from the migration locus of the thread-guard section 26 to back, while it had made the location by the side of the aforementioned yarn bundle (location corresponding to the halt-on needle location of a needle bar 18) stop the thread-guard section 26 of a balance 25, yarn inlet 108a can be interlocked with the wearing actuation to the cassette mount 3 of the needle-thread cassette 2, and can carry out a thread guard to the thread-guard section 26.

[0121] And yarn cage riding clearance 108 One pair of tension-thread-guard implements 106 which make tension-thread-guard member 106A covering the overall length of the migration locus of the thread-guard section 26 Since it is made to have inserted in U form guidance section 25a of a balance 25 free [relative sliding], even if a balance 25 carries out both-way migration up and down at the time of sewing, a needle thread 24 is the tension-thread-guard implement 106. It shows around and does not separate from the thread-guard section 26. Moreover, tension-thread-guard implement 106 on the backside Since the upper limit section is supported pivotably enabling free rotation, Tension-thread-guard implement 106 of 25a1 pair of U form guidance section of a balance 25 Since it can

show around one pair of tension-thread-guard implements 106 a line -- U form guidance section 25a and one pair of tension-thread-guard implements 106 in being able to constitute from an ingredient like a member which is easy to process it cheaply A sliding friction stops almost acting in between, and a sliding sound is hardly produced, either.

[0122] 7) the case where a needle bar 18 is in the predetermined height range of the needle top locations in said automatic threader device 10 -- as long as -- That is, since the automatic threader to pinholing 19a which restricts when a stopper 123 is in the proper range of (b) of drawing 8 - (b), and is interlocked with wearing actuation of the needle-thread cassette 2 is possible, There is no possibility of equipping with the needle-thread cassette 2 and causing the threader mistake to pinholing 19a while the location of a needle bar 18 has been unsuitable, and it excels in the dependability of actuation, and operability. And since it constitutes through engagement to the threader positioning member 52 prepared in the location which a needle bar 18 stops on a needle in view of an error arising at the threader slider 40 and the needle bar 18 so that the height location of the automatic threader device 10 over a needle bar 18 may be made to agree, a threader can be certainly carried out to pinholing 19a.

[0123] next, said operation gestalt was changed partially -- strange -- a gestalt is explained at all. Drawing 49 shows the outline of the control system of said sewing machine 1, and the signal from a detection-under needle sensor, a main shaft phase angle detection sensor, the other sensors besides illustration, or switches is inputted into a control unit on a needle. A control unit has two or more drive circuits for the computer which controls based on the various control programs for sewing-machine control, and two or more devices for a drive etc. Drive control of a sewing-machine motor, the stepping motor for needle swings, the stepping motor for cloth delivery, etc. is carried out with this control unit.

[0124] Only when said needle bar 18 is in a needle top location, wearing of the needle-thread cassette 2 to a cassette mount 3 is permitted. When a needle bar 18 is in locations other than a needle top location, in order to forbid wearing of the needle-thread cassette 2 The stopper which can appear frequently into a cassette mount 3 is formed near the upper limit of a cassette mount 3. The electric actuator which carries out the frequent appearance drive of this stopper and which consists of a solenoid actuator etc., for example is formed. Based on the detecting signal from a detection-under needle sensor, drive control of the electric actuator is carried out with a control unit on a needle. Only when a needle bar 18 is in a needle top location, wearing of the needle-thread cassette 2 is permitted by holding a stopper in a ** ON location, and when a needle bar 18 is in locations other than a needle top location, it considers as the configuration which switches a stopper to an advance location and forbids wearing of the needle-thread cassette 2.

[0125] Next, another operation gestalt of this invention is explained with reference to a drawing. However, the same sign is given to the same member as said operation gestalt, and explanation is omitted suitably. In electronics control type sewing-machine 1A which starts another operation gestalt as shown in drawing 50 -52 In the front section of the balance migration field as for which the thread-guard section 26 of the balance 25 of those for the tip flank of the arm section 6 carries out both-way migration up and down, and its near section, it is the actuation object applied part 200. It is formed. this body applied part 200 Actuation object 201 for thread guards as a movable actuation object with which it is equipped removable A thread tension unit 9 and the resistance grant section 205 Actuation object 201 for thread guards Wearing actuation is interlocked with and it is the stitch-balancing-thread-tension pan 133 of a thread tension unit 9. Resistance grant section 205 The interlock 202 made to open and close is established (refer to drawing 58).

[0126] If a yarn path is explained first, as shown in drawing 50 - drawing 52 , the needle thread 24 prolonged from yarn-die 62A held sideways at the crowning by the side of the end face of the arm section 6 Longitudinal yarn guide rail 204 formed in the front section by the side of the tip of the yarn guide rail 203 of the longitudinal-direction sense formed in a part for the top-face flank of the arm section 6, the actuation object applied part 200, and the arm section 6 one by one It goes and is hung on a needle bar thread guard 147, yarn guide 36a, and the tension-thread-guard pan 56. yarn guide rail 203 **** -- the order from the upstream -- the resistance grant section 205 The thread tension unit 9 is arranged. Actuation object applied part 200 The thread-guard section 26 of a balance 25 is ***** (ed) so that both-way migration may be carried out up and down in a center

section. In addition, stitch-balancing-thread-tension dial 206 for adjusting the spring force of a thread tension unit 9 It is equipped.

[0127] next, actuation object 201 for thread guards ***** -- it explains. As shown in drawing 50 , drawing 51 , drawing 54 , drawing 55 , drawing 57 - drawing 59 , it is the actuation object 201 for thread guards. It is the thing of the shape of an abbreviation rectangular parallelepiped long and slender in the direction of a vertical, and is the actuation object applied part 200. It receives and is movable at least at predetermined within the limits. Actuation object 201 for thread guards It has front wall section 201c of a lower limit which stands in a row to the upper part a little, left-hand side wall 201a, and right-hand side wall 201b from upper limit. The interior 208 of a proposal-ed bent by the back end of left-hand side wall 201a to the left It is formed and is this interior 208 of a proposal-ed. Actuation object applied part 200 It shows around possible [vertical movement] by slit 200a. Interior of proposal-ed 208b bent to the method of the right is formed in the back end of right-hand side wall 201b, and this interior of proposal-ed 208b is the actuation object applied part 200. It shows around possible [vertical movement] by guide rail 200b. Actuation object 201 for thread guards Front wall 201c is the actuation object applied part 200. It constitutes from guidance wall 200c by the side of before possible [guidance] free [vertical movement] .

[0128] The lower limit side of left-hand side wall 201a and right-hand side wall 201b is formed horizontally, and the lower limit section of right-hand side wall 201b is the actuation object 201 for thread guards. Actuation object applied part 200 In case insertion wearing is carried out, it is the needle-thread control unit which operates the needle thread 24 prolonged in a balance 25 from a thread tension unit 9, and carries out a thread guard to the thread-guard section 26. actuation object 201 for thread guards Lobe 209 which projects a little ahead in the upper limit section it forms -- having -- this lobe 209 a finger -- applying -- actuation object 201 for thread guards upper part migration is carried out -- making -- actuation object applied part 200 from -- balking has become possible.

[0129] As shown in drawing 50 , drawing 53 - drawing 55 , and drawing 62 , it is the interior 208 of a proposal-ed. In case the threader of the needle thread 24 is carried out to pinholing 19a, actuation section 208a as the threader actuation section which operates the automatic threader device 10 is formed in the lower limit section. threader slider operation system 116 setting -- lever 120 **** -- lever section 120b which projects in the shape of L character forms ahead from the right end upper case section -- having -- actuation object 201 for thread guards it is wearing actuation -- on the way - - since -- the push drive of the lever section 120b is carried out from the upper part, and the same automatic threader device 10 as said operation gestalt is operated.

[0130] actuation object applied part 200 a wall surface -- actuation object applied part 200 from -- actuation object 201 for thread guards from which it was made to secede Flat spring 210 held in the best location shown in drawing 54 The bis-stop is carried out. in addition, actuation object 201 for thread guards Actuation object applied part 200 from -- it may demount, you may constitute possible and the thread guard to the thread-guard section 26 of a balance 25 becomes easy in this case. Actuation object applied part 200 It is the section near the front face of the arm section 6, and is the actuation object 201 for thread guards to the near section of a balance migration field. It is formed in a vertical possible [wearing] by linear migration, and is the actuation object 201 for thread guards. It constitutes so that insertion wearing can be carried out smoothly.

[0131] next, actuation object 201 for thread guards Interlock 202 which interlocks actuation of wearing with a thread tension unit 9 ***** -- it explains. it is shown in drawing 53 - drawing 62 - - as -- interlock 202 Cam section 211 Cam follower member 212 Actuation plate 213 It has. Actuation object 201 for thread guards Actuation object applied part 200 [in the middle of the wearing actuation with which it equips] Actuation object 201 for thread guards Stitch-balancing-thread-tension pan 133 of a thread tension unit 9 Resistance grant section 205 It is made to open wide and is the stitch-balancing-thread-tension pan 133 at the time of completion of wearing actuation. Resistance grant section 205 It closes. that is, it is shown in drawing 54 -- as -- actuation object 201 for thread guards the lower right half section -- the vertical direction -- meeting -- the cam section 211 it forms -- having -- this cam section 211 **** -- sequentially from the lower part, ramp 211a, flat part 211b, ramp 211c, and 211d of flat parts are formed.

[0132] pivot 214 supported pivotably by the sewing-machine machine frame **** -- cam follower

member 212 The lower limit section is supported free [rotation]. this cam follower member 212 The lever section 215,216 of two sheets These lever section 215,216 The connection section 217 connected in one in the lower limit section Cam follower pin 218 etc. -- it has. the lever section 215,216 of two sheets suitable spacing ***** parallel -- and it arranges so that it may become the phase angle of about 15 degrees by side view -- having -- the lever section 215 an end, i.e., the upper limit section, -- cam follower pin 218 it attaches so that it may project to the left -- having -- this cam follower pin 218 -- the cam section 211 It is constituted possible [contact].

[0133] it is shown in drawing 54 and drawing 58 -- as -- thread tension unit 9 **** -- the lever section 216 Actuation plate 213 by which a push drive is carried out in the upper limit section (other end of a cam follower member) it prepares -- having -- this actuation plate 213 a push drive is carried out -- having -- stitch-balancing-thread-tension pan 133 It opens. pivot 214 **** -- twisting -- spring 219 sheathing is carried out -- having -- drawing 58 -- setting -- cam follower member 212 It is energizing to the circumference of a counterclockwise rotation. the resistance grant section 205 the yarn which gives moderate passage resistance to a needle thread 24 in the upstream, looks like [a needle thread 24] from yarn, and is twisted to it rather than a thread tension unit 9 -- twining -- etc. - - it is a thing for preventing generating. Said lever section 216 It is bent by the right angle to the method of the right, and the upper limit section is the horizontal plate section 220. Actuation plate 213 Stitch-balancing-thread-tension pan 133 It synchronizes with opening and is the resistance grant section 205. The push drive of the pressure plate 205a is carried out, and pressure plate 205a is opened (refer to drawing 60 and drawing 61). Horizontal plate section 220 At the time of un-operating, pressure plate 205a is held in the condition of having closed according to the energization force of resistance grant spring 205b.

[0134] Next, an operation of sewing-machine 1A explained above is explained. It is the yarn guide rail 203 by the operator about the needle thread 24 pulled out from yarn-die 62A as shown in drawing 50 - drawing 52 . Through and actuation object 201 for thread guards In the condition of having made it moving to the best location, a needle thread 24 is hung on the thread-guard section 26 of a balance 25, and it is the yarn guide rail 204. It lets it pass, pulls out to near a needle 19, and hangs on a needle bar thread guard 147, yarn guide 36a, and the tension-thread-guard pan 56 (refer to drawing 5). Next, the margin of string is cut to fixed die length, and it is the actuation object 201 for thread guards. Actuation object applied part 200 Push operation is carried out linearly and it is the actuation object applied part 200. Insertion wearing is carried out.

[0135] It follows on this wearing actuation and is the cam follower pin 218 first. Cam section 211 Ramp 211a is contacted and it is the stitch-balancing-thread-tension pan 133. Pressure plate 205a is opened wide and the thread guard of the needle thread 24 is carried out to these. It is concurrent with this and is a tension spring 135. A thread guard is carried out and it is the actuation object 201 for thread guards. It is depressed below by the needle-thread control unit of the lower limit section of right-hand side wall 201b so that the needle thread 24 between the thread-guard sections 26 of a thread tension unit 9 and a balance 25 may lengthen the yarn path of the both sides of a balance 25, and by it, the amount of yarn picking of a balance 25 is secured.

[0136] Then, flat part 211b and ramp 211c are a pin 218. It contacts, it sets in the ordinary-dress arrival completion condition shown in drawing 62 and drawing 63 , and 211d of flat parts is a pin 218. If it contacts, the stitch-balancing-thread-tension pan 9 and pressure plate 205a will close. On the other hand, it is the actuation object 201 for thread guards. Actuation object applied part 200 It is the actuation object 201 for thread guards like said operation gestalt from from, and abbreviation while carrying out insertion wearing. Actuation is transmitted to the automatic threader device 10 through the transfer device 115, the threader to pinholing 10a is performed according to this automatic threader device 10, and it will be in a sewing possible condition. At this time, it is the actuation object 201 for thread guards in order for actuation section 208a to make lever section 120b push below. Wearing actuation is the transfer device 115. It is transmitted.

[0137] Sewing-machine 1A and the actuation object 201 for thread guards which were explained above The following effectiveness is done so.

1) Actuation object 201 for thread guards long and slender in the direction of a vertical instead of said needle-thread cassette 2 Since it has adopted, it is the actuation object 201 for thread guards. Actuation object applied part 200 A miniaturization can be attained and effect of the appearance on

the front face of the arm section 6 can also be lessened.

[0138] 2) Interlock 202 Actuation object 201 for thread guards Actuation object applied part 200 The wearing actuation is interlocked with in the middle of the wearing actuation with which it equips, and it is the actuation object 201 for thread guards. Stitch-balancing-thread-tension pan 133 of a thread tension unit 9 Resistance grant section 205 Pressure plate 205a is made to open wide, and it is the thread tension unit 9 and the resistance grant section 205 of the open condition. A needle thread 24 can be hung. And actuation object 201 for thread guards At the time of completion of wearing actuation, they are the stitch-balancing-thread-tension pan 9 and the resistance grant section 205. It can be made to close. It is [this thread guard and] the actuation object 201 for thread guards-like in parallel. Actuation object applied part 200 The wearing actuation with which it equips can be interlocked with, and a threader can also be performed automatically.

[0139] In this way, actuation object 201 for thread guards Wearing is interlocked with and they are a thread tension unit 9 and the resistance grant section 205 about a needle thread 24. Since an automatic threader can be performed while being able to carry out a thread guard, the thread-guard actuation and threader actuation at the time of supply of a needle thread 24 or exchange simplify, and the working efficiency of needle-thread exchange increases.

[0140] 3) interlock 202 Actuation object 201 for thread guards The formed cam section 211 An end is the cam section 211. Cam follower member 212 which can contact and by which the section was supported free [rotation] in the middle of the die-length direction This cam follower member 212 Actuation plate 213 which a push drive is carried out [plate] by the other end, and makes a thread tension unit 9 open wide Since it has, It becomes employable [the cheap thread tension unit 9 of the general configuration as a thread tension unit 9].

[0141] In addition, said actuation object 201 for thread guards Although it did not connect with the arm section 6 of sewing-machine 1A directly but was a dismountable configuration from the arm section 6, it is the actuation object 201 for thread guards. You may make it the configuration connected with the arm section 6 through the link mechanism and rocking link member of an parallel link and others.

[0142]

[Effect of the Invention] While setting a needle thread to the thread-guard section of a balance by preparing a movable actuation object movable at least at predetermined within the limits in the arm section, and making it move by said predetermined within the limits of this movable actuation object according to invention of claim 1 Since it constituted so that said automatic threader device might be operated and the threader of the needle thread might be carried out to a pinholing Since you can make it migration of a movable actuation object interlocked with, and a thread guard can be carried out to the thread-guard section of a balance and the threader of the needle thread can be carried out to a pinholing, the thread-guard activity to the thread-guard section of a balance and the threader activity to a pinholing can be simplified, and working capacity can be raised.

[0143] In case the thread guard of the needle thread is carried out to the thread-guard section of a balance, in according to invention of claim 2 being able to operate a needle thread by the needle-thread control unit and being able to carry out a thread guard, in case the threader of the needle thread is carried out to a pinholing, an automatic threader device can be operated by the threader actuation section, and a threader can be performed. In addition, the same effectiveness as claim 1 is done so.

[0144] Since the actuation object for equipping the anterior part of the arm section or the front section of said sewing machine with a movable actuation object removable was formed according to invention of claim 3, in becoming easy to perform attachment-and-detachment actuation of a movable actuation object, it is advantageous also in respect of hanging a needle thread on the thread-guard section and the thread tension unit of a balance which are located in the front section of the arm section. In addition, claim 1 or the same effectiveness as invention of 2 is done so.

[0145] Since a movable actuation object is a needle-thread cassette which supplies the needle thread which held the yarn die and it let out from the yarn die to a balance side according to invention of claim 4, a needle thread can be supplied from a needle-thread cassette. Besides, a yarn cassette is removable in the arm section, it is only operated to a needle-thread cassette wearing-side, can perform easily the threader to the thread guard and pinholing to the thread-guard section of a

balance, and can also perform exchange of a needle thread easily through a needle-thread cassette. In addition, the same effectiveness as any of claims 1-3 they are is done so.

[0146] According to invention of claim 5, it is a cassette mount as said actuation object applied part at the front section of the arm section of a sewing machine. Since the groove cassette mount to which a needle-thread cassette wearing-side is opened wide, and it shows a needle-thread cassette in the shape of a straight line at the time of attachment and detachment of a needle-thread cassette was formed, in case it equips with a needle-thread cassette In case it can equip by the easy actuation of equipping cassette wearing with a needle-thread cassette from a wearing side, and making it move to it linearly and a needle-thread cassette is removed, it can remove by making it move linearly. In addition, the same effectiveness as claim 4 is done so.

[0147] According to invention of claim 6, prepare the balance migration field where the thread-guard section of a balance moves up and down to a part of cassette mount, prepare the thread tension unit which projects in a part of other cassette mounts, and the wearing actuation to the cassette mount of a needle-thread cassette is interlocked with. Since it constituted so that an automatic threader device might be operated and the threader of the needle thread might be carried out to a pinholing while carrying out the thread guard of the needle thread in a needle-thread cassette to the balance and the thread tension unit at least, a balance, the thread guard to a thread tension unit, and the threader to a pinholing can be performed efficiently easily. In addition, the same effectiveness as claim 5 is done so.

[0148] According to invention of claim 7, prepare the thread tension unit containing a stitch-balancing-thread-tension pan and a tension spring so that it may project in a cassette mount, and the wearing actuation to the cassette mount of a needle-thread cassette is interlocked with. Since it constituted so that an automatic threader device might be operated and the threader of the needle thread might be carried out to a pinholing while carrying out the thread guard of the needle thread in a needle-thread cassette to the thread-guard section, stitch-balancing-thread-tension pan, and tension spring of a balance The thread guard of the needle thread in a yarn cassette can be automatically carried out to the thread-guard section, stitch-balancing-thread-tension pan, and tension spring of a balance, the threader of the needle thread can be automatically carried out to a pinholing through an automatic threader device, and the thread guard at the time of needle-thread exchange and the working capacity of a threader can be raised. In addition, the same effectiveness as claim 6 is done so.

[0149] Since according to invention of claim 8 it constituted so that a needle thread might be manually hung on an automatic threader device where a cassette mount is equipped with a needle-thread cassette to an intermediate location, and an automatic threader device might be operated by wearing actuation of a subsequent needle-thread cassette A cassette mount is equipped with a needle-thread cassette to an intermediate location, in the condition of having changed into the condition that a hand can be lifted from a needle-thread cassette, a needle thread can be manually hung on an automatic threader device, an automatic threader device can be operated by wearing actuation of a subsequent needle-thread cassette, and a threader can be performed. The same effectiveness as any of claims 5-8 they are is done so.

[0150] According to invention of claim 9, the transfer device in which actuation of a movable actuation object is transmitted to an automatic threader device Since the engagement device which carries out discharge actuation by engagement to the piece of engagement fixed to the needle bar or the needle bar is established, Since discharge actuation of the engagement device can be carried out according to the height location of the needle bar of a idle state, even if the height location of a pinholing has shifted according to the height location of a needle bar, discharge actuation can be carried out after performing a threader certainly. The same effectiveness as any of claims 1-8 they are is done so.

[0151] Since the movable actuation object was constituted movable only when according to invention of claim 10 a detection means to detect the actuated position of a needle bar at least was established, it was examined for this detection means and a needle bar was in a predetermined location Only when a needle bar is in a predetermined location and the height location of a pinholing has it in a fixed height location A movable actuation object can be moved, an automatic threader device can be operated, a threader can be performed smoothly, the threader mistake resulting from

gap of the height location of a needle bar can be prevented, and breakage of an automatic threader device can be prevented certainly. In addition, the same effectiveness as any of claims 1-9 they are is done so.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] They are the electronics control type sewing machine of the operation gestalt of this invention, and the front view of a needle-thread cassette.

[Drawing 2] It is the top view of the sewing machine in the condition of having demounted the needle-thread cassette.

[Drawing 3] It is drawing of longitudinal section showing the internal structure near a cassette mount.

[Drawing 4] It is the flat-surface sectional view showing the internal structure near a cassette mount etc.

[Drawing 5] They are front views, such as a needle-bar vertical-movement device and an automatic threader device.

[Drawing 6] It is the drawing 5 equivalent Fig. showing a just before [a threader] condition.

[Drawing 7] It is the drawing 5 equivalent Fig. showing the relation between a needle bar and a stopper.

[Drawing 8] It is the drawing 5 equivalent Fig. explaining the proper height range of a needle bar.

[Drawing 9] The perspective view showing the just before [a threader] condition according [(a)] to a threader hook, the perspective view in which (b) shows a threader direct status post, and (c) are the important section sectional views in the condition that the threader hook went up after the threader.

[Drawing 10] They are vertical section side elevations, such as a threader slider operation system and a needle-thread cassette.

[Drawing 11] It is the important section vertical section side elevation showing a balance device and a cassette mount.

[Drawing 12] It is the important section vertical section side elevation showing the successive range of the thread-guard section of a balance.

[Drawing 13] It is the drawing 12 equivalent Fig. showing the thread-guard possible range of the thread-guard section.

[Drawing 14] They are a needle-thread cassette (just before [wearing] condition), and the front view of a cassette mount.

[Drawing 15] They are a needle-thread cassette (condition in the middle of wearing), and the front view of a cassette mount.

[Drawing 16] They are a needle-thread cassette (condition in the middle of wearing), and vertical section side elevations, such as a cassette mount.

[Drawing 17] They are a needle-thread cassette (just before [the completion of wearing] condition), and the front view of an arm head.

[Drawing 18] It is the partial expanded sectional view of the 2nd pinching section and a cam.

[Drawing 19] They are a needle-thread cassette (the completion condition of wearing), and the front view of an arm head.

[Drawing 20] It is the drawing 18 equivalent Fig. showing the 2nd pinching section (open condition) and a cam.

[Drawing 21] It is the cross-sectional view of the needle-thread cassette with which the cassette mount was equipped.

[Drawing 22] They are a needle-thread cassette (the completion condition of wearing), and vertical

section side elevations, such as a cassette mount.

[Drawing 23] It is the front view of a needle-thread cassette (closing motion lid-open state).

[Drawing 24] It is the vertical section side elevation of a needle-thread cassette.

[Drawing 25] It is the top view of a needle-thread cassette.

[Drawing 26] It is the bottom view of a needle-thread cassette.

[Drawing 27] It is the partial notch crossing top view of the needle-thread cassette in which the downstream part of a yarn path is shown.

[Drawing 28] It is the vertical section side elevation of the body of a cassette, and a yarn die (front [wearing] condition).

[Drawing 29] It is the vertical section side elevation of the body of a cassette, and a yarn die (wearing status post).

[Drawing 30] It is the front view of a needle-thread cassette (closing motion lid-open state).

[Drawing 31] It is the bottom view of a needle-thread cassette (closing motion lid-open state).

[Drawing 32] It is the top view of the body of a cassette in which the interior of the 1st proposal is shown.

[Drawing 33] It is the bottom view of the needle-thread cassette in which the 2nd, the interior of the 3rd proposal, and the 2nd pinching section are shown.

[Drawing 34] It is the cross-sectional view of the body of a cassette in which the 2nd, the interior of the 3rd proposal, and the 2nd pinching section are shown.

[Drawing 35] It is the front view of the needle-thread cassette explaining the procedure of a yarn stop.

[Drawing 36] It is the side elevation of the needle-thread cassette in which the yarn stop section etc. is shown.

[Drawing 37] They are front views, such as a knee lifter lifting lever, a thread tension unit, and an interlock.

[Drawing 38] They are side elevations, such as a knee lifter lifting lever, a thread tension unit, and an interlock.

[Drawing 39] They are top views, such as a knee lifter lifting lever, a thread tension unit, and an interlock.

[Drawing 40] It is the drawing 37 equivalent Fig. showing the condition at the time of needle-thread cassette wearing.

[Drawing 41] It is the drawing 38 equivalent Fig. showing the condition at the time of needle-thread cassette wearing.

[Drawing 42] It is a showing [the condition in the middle of needle-thread cassette wearing] drawing 39 equivalent Fig.

[Drawing 43] It is the drawing 39 equivalent Fig. showing the completion condition of needle-thread cassette wearing.

[Drawing 44] It is the drawing 37 equivalent Fig. showing the completion condition of needle-thread cassette wearing.

[Drawing 45] It is the drawing 38 equivalent Fig. showing the completion condition of needle-thread cassette wearing.

[Drawing 46] It is the front view of the sewing machine in the case of carrying out sewing using the needle thread of the exterior of a needle-thread cassette.

[Drawing 47] It is the top view of the sewing machine in the case of carrying out sewing using the needle thread of the exterior of a needle-thread cassette.

[Drawing 48] It is the front view of the sewing machine at the time of applying 2 needles.

[Drawing 49] It is the outline block diagram of the control system of a sewing machine.

[Drawing 50] They are the electronics control type sewing machine of another operation gestalt, and the front view of the actuation object for thread guards.

[Drawing 51] It is the side elevation of a sewing machine and the actuation object for thread guards.

[Drawing 52] It is the top view of a sewing machine.

[Drawing 53] It is the partial notch cross-sectional view showing the internal structure important section near an actuation object applied part.

[Drawing 54] They are near an actuation object applied part and drawing of longitudinal section of

the actuation object for thread guards.

[Drawing 55] It is the important section cross-sectional view showing the completion condition of wearing of the actuation object for thread guards.

[Drawing 56] It is an important section cross-sectional view near the lower limit section of an actuation object applied part.

[Drawing 57] It is drawing of longitudinal section showing the relation between a balance device, the thread-guard section, and the actuation object for thread guards.

[Drawing 58] It is drawing of longitudinal section showing the relation between an interlock and a thread tension unit.

[Drawing 59] It is drawing of longitudinal section showing the relation between an interlock and the resistance grant section.

[Drawing 60] It is the expanded sectional view of the resistance grant section (closed state).

[Drawing 61] It is the expanded sectional view of the resistance grant section (open condition).

[Drawing 62] They are near an actuation object applied part and the drawing 54 equivalent Fig. of the actuation object for thread guards (the completion condition of wearing).

[Drawing 63] They are near an actuation object applied part and the drawing 57 equivalent Fig. of the actuation object for thread guards (the completion condition of wearing).

[Description of Notations]

- 1 1A Sewing machine
- 2 Needle-Thread Cassette
- 3 Cassette Mount
- 6 Arm Section
- 8 Balance Device
- 9 Thread Tension Unit
- 10 Threader Device
- 24 Needle Thread
- 25 Balance
- 25a U form guidance section
- 26 Thread-Guard Section
- 27 Balance Migration Field
- 57 Cassette Case
- 58 Yarn-Die Attaching Part
- 59 Yarn Path
- 62 Yarn Die
- 65 Crevice
- 68 Yarn Outlet
- 69 Interior of 1st Proposal
- 70 1st Pinching Section
- 71 Interior of 2nd Proposal
- 72 Interior of 3rd Proposal
- 73 2nd Pinching Section
- 80 Pressure Plate
- 81 Flat Spring
- 82 It is Generating Prevention Device from Yarn.
- 84 Guide Pins
- 90 Yarn Maintenance Plate
- 91 Flat-Spring Member
- 104A Yarn stop section
- 106 Tension-Thread-Guard Implement
- 106A Tension-thread-guard member
- 108 Yarn Cage Riding Clearance
- 108a Inlet
- 133 Stitch-Balancing-Thread-Tension Pan
- 135 Tension Spring

200 Actuation Object Applied Part
201 Actuation Object for Thread Guards
207 Needle-Thread Control Unit
208a Threader actuation section

[Translation done.]

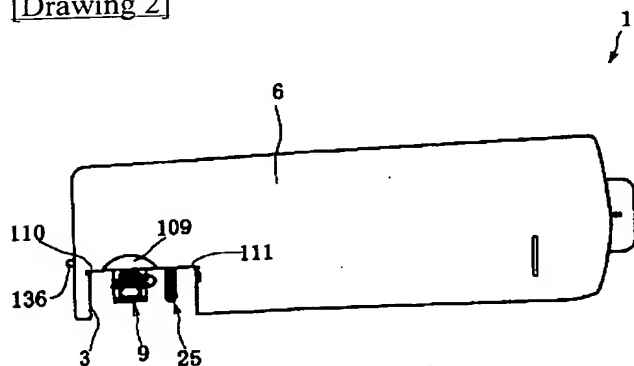
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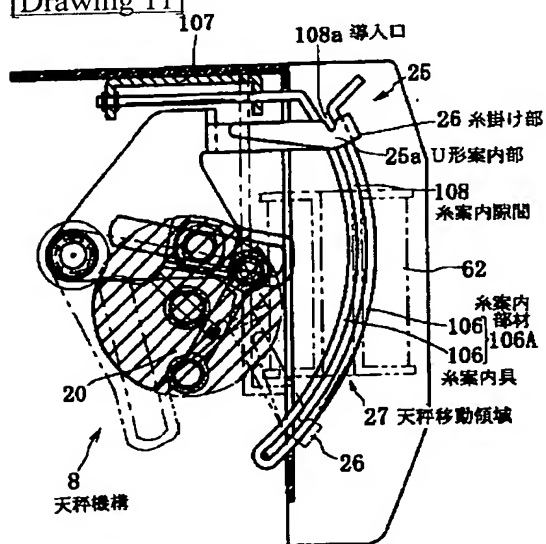
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DRAWINGS

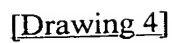
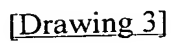
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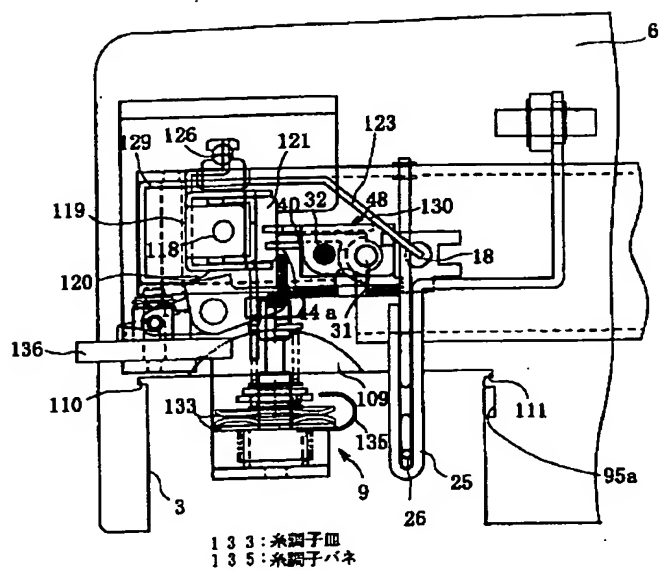


[Drawing 11]

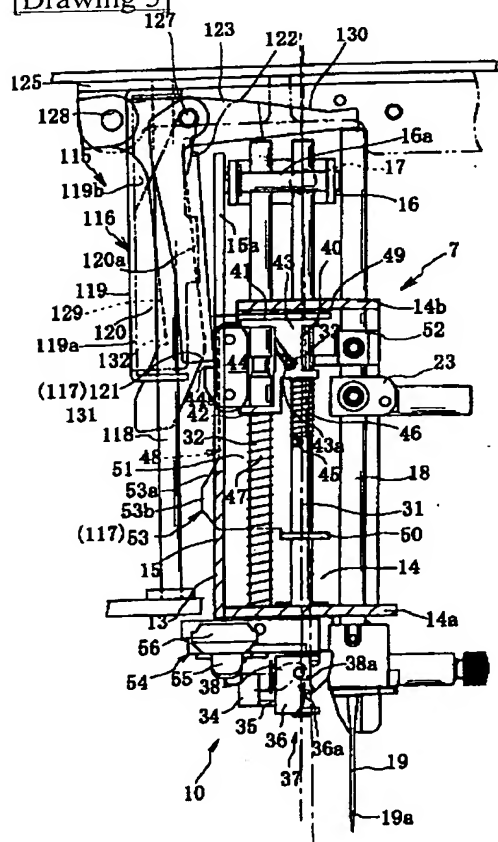


[Drawing 1]

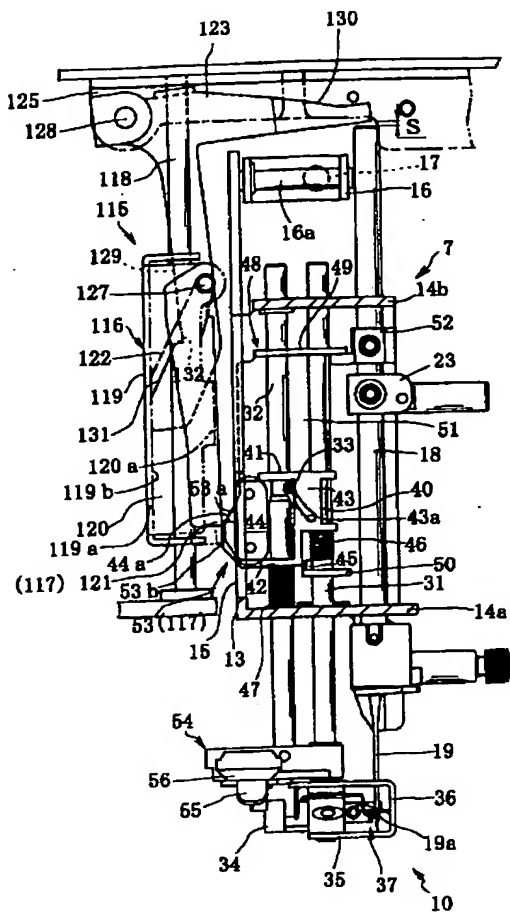




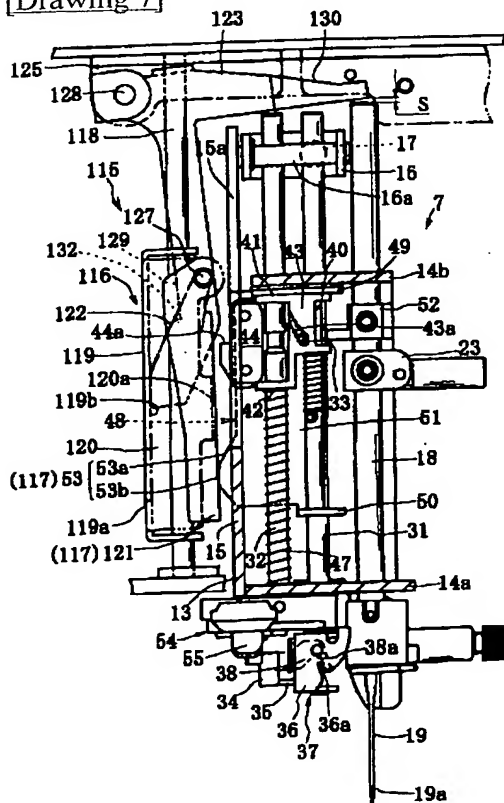
[Drawing 5]



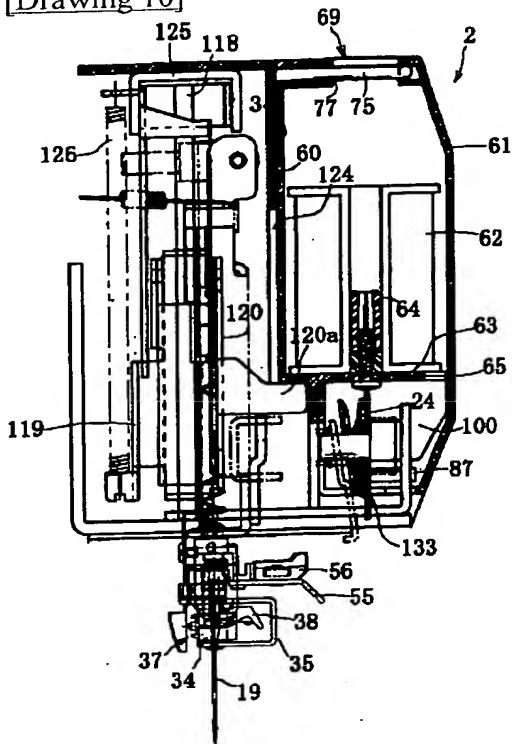
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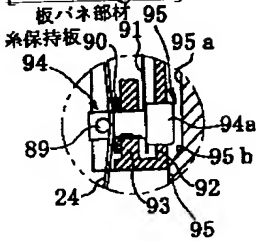
[Drawing 7]



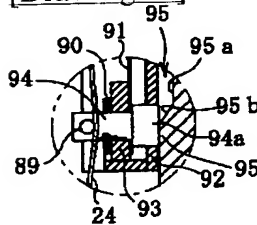
[Drawing 10]



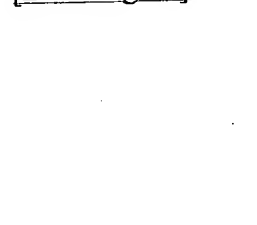
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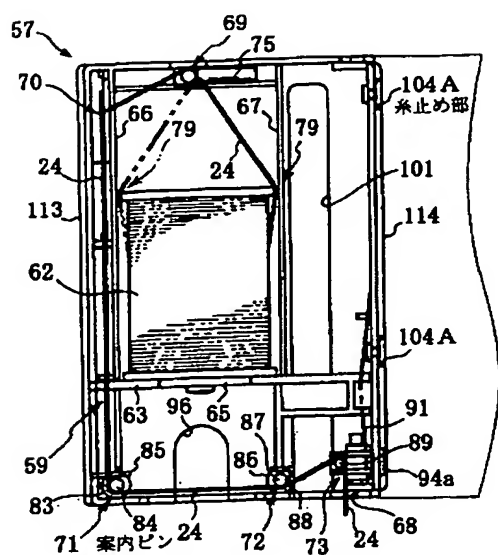


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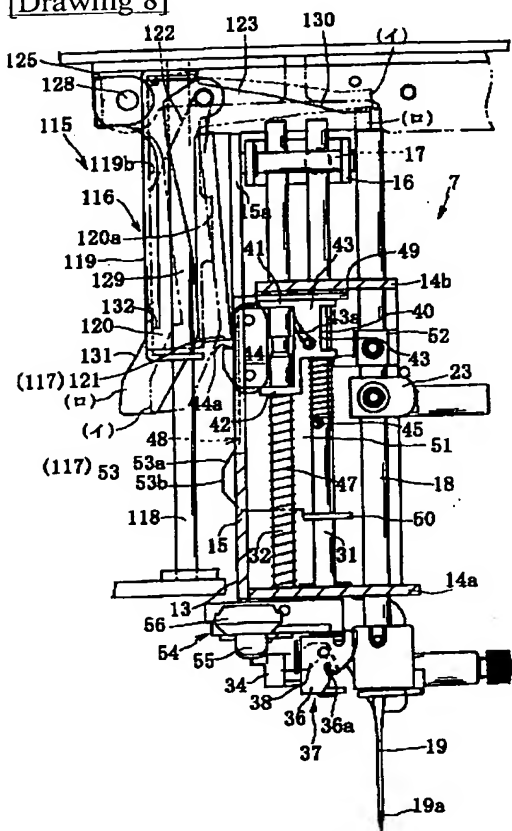


[Drawing 23]

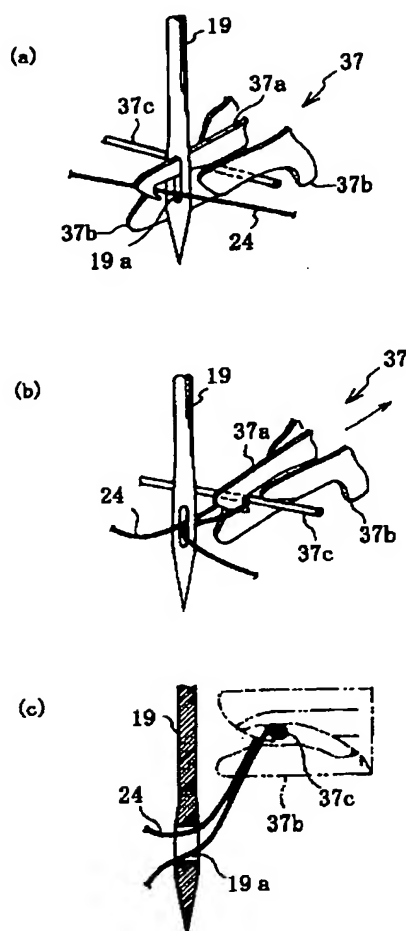




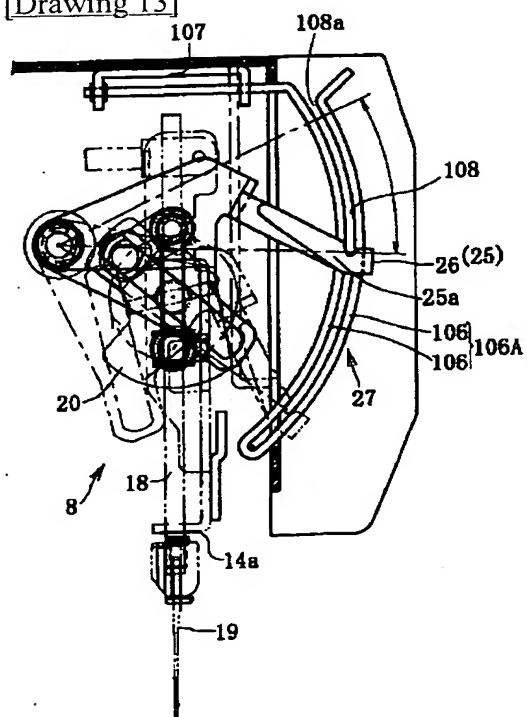
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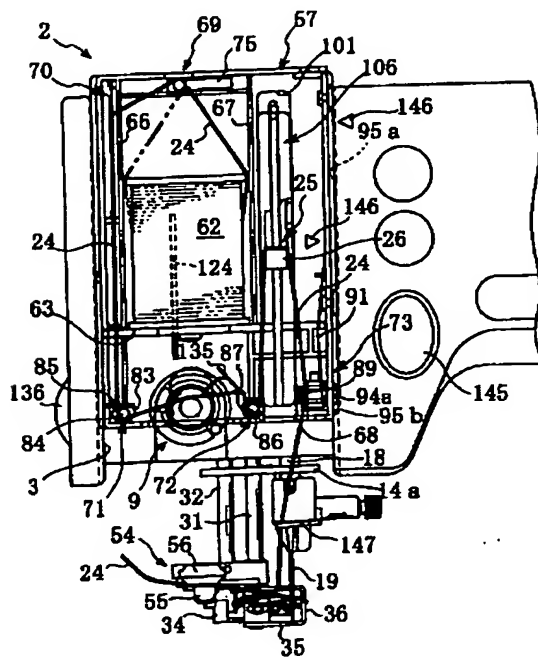
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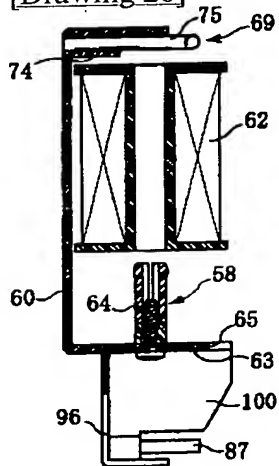
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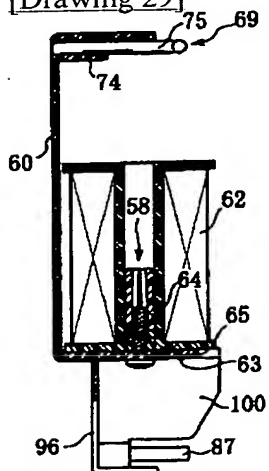
[Drawing 17]



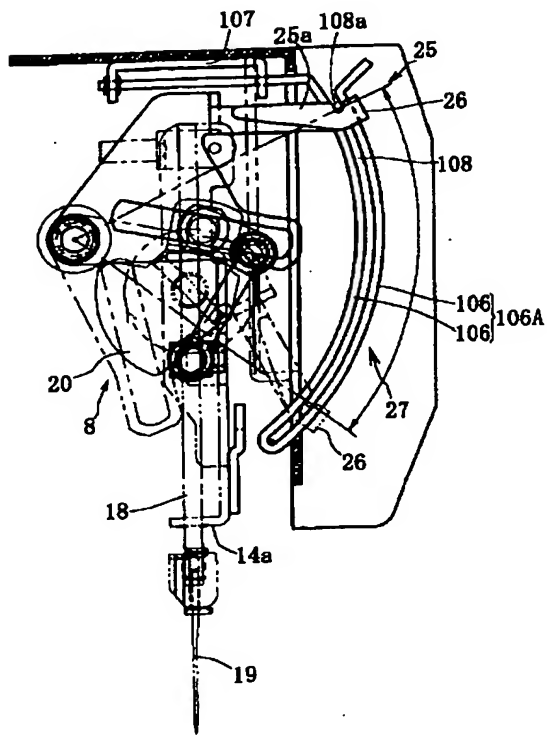
[Drawing 28]



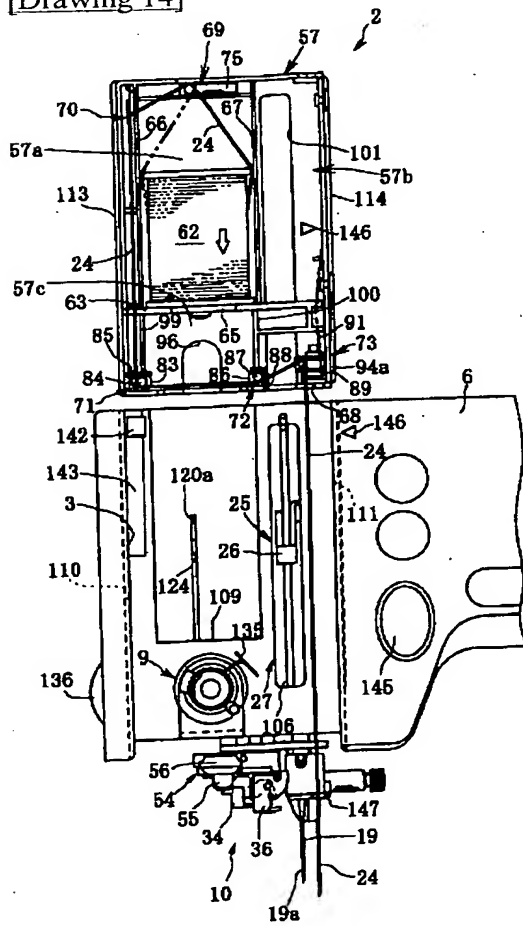
[Drawing 29]



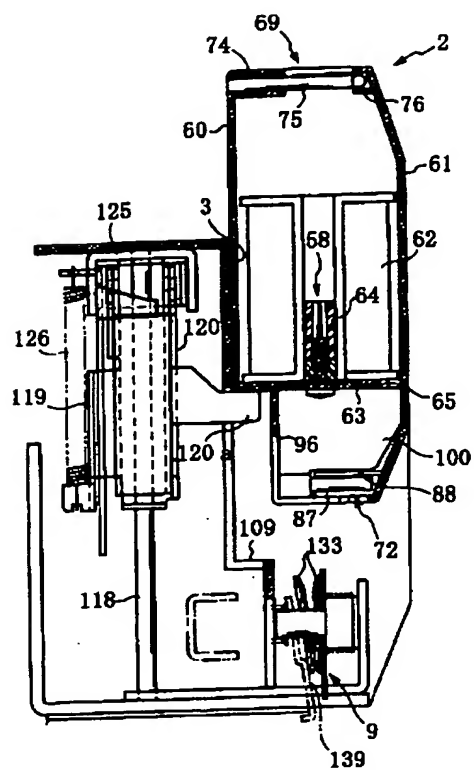
[Drawing 12]



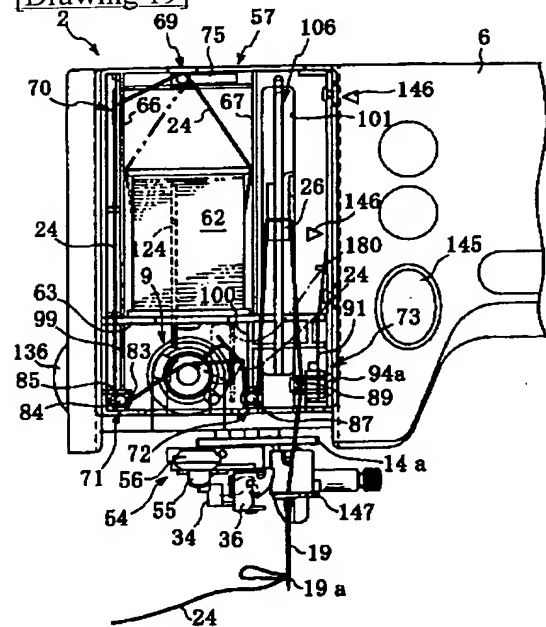
[Drawing 14]



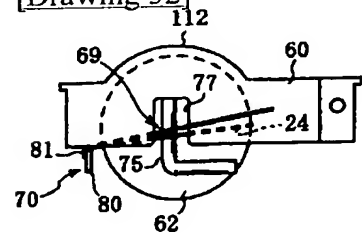
[Drawing 16]



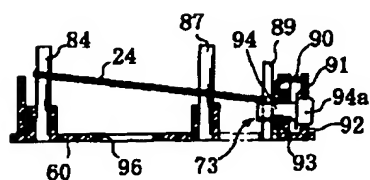
[Drawing 19]



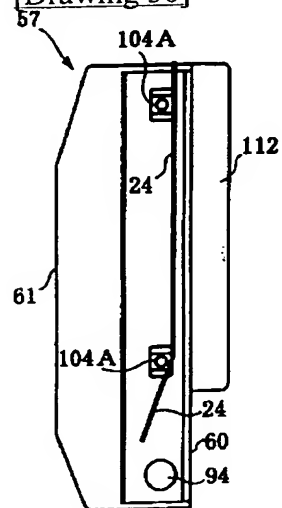
[Drawing 32]



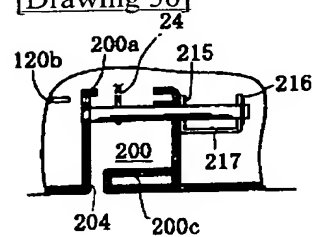
[Drawing 34]



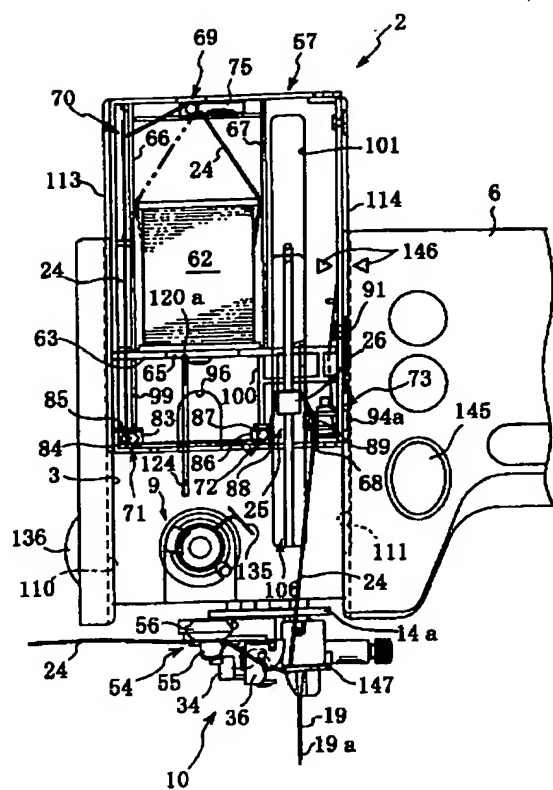
[Drawing 36]



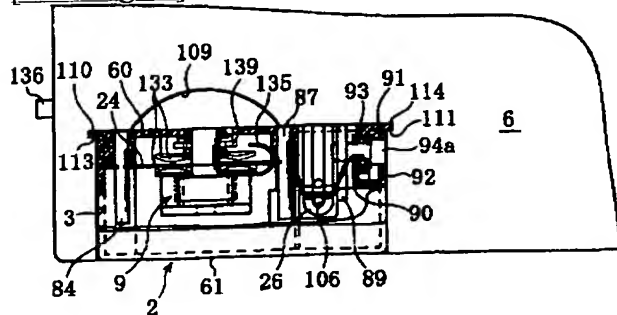
[Drawing 56]



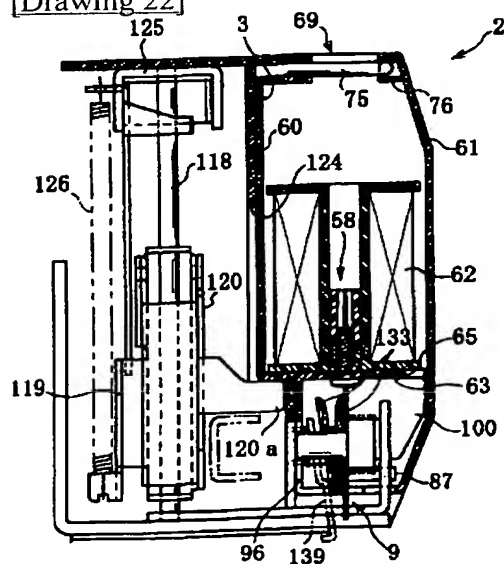
[Drawing 15]



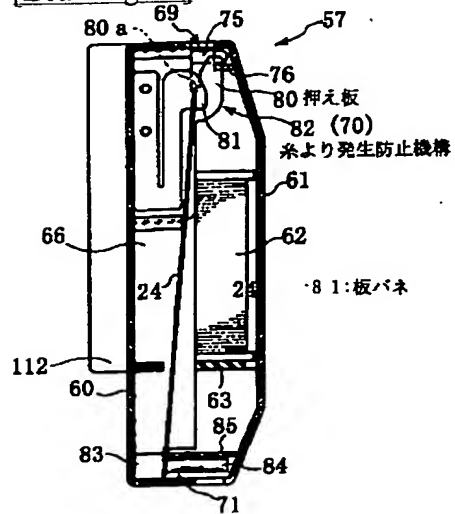
[Drawing 21]



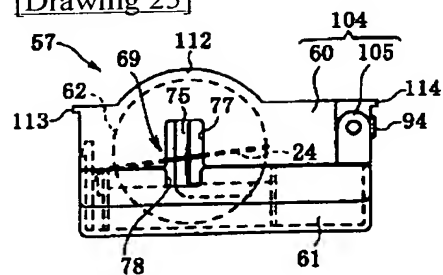
[Drawing 22]



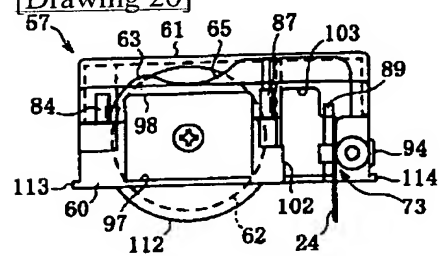
[Drawing 24]



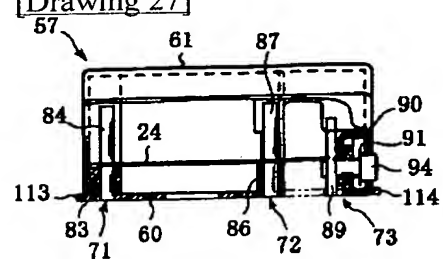
[Drawing 25]



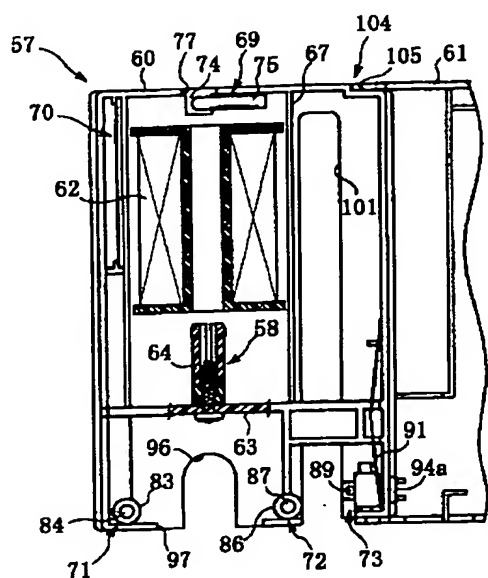
[Drawing 26]



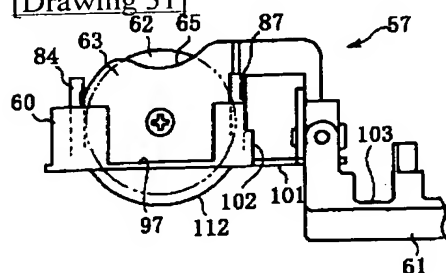
[Drawing 27]



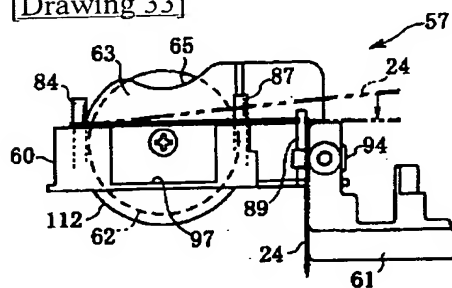
[Drawing 30]



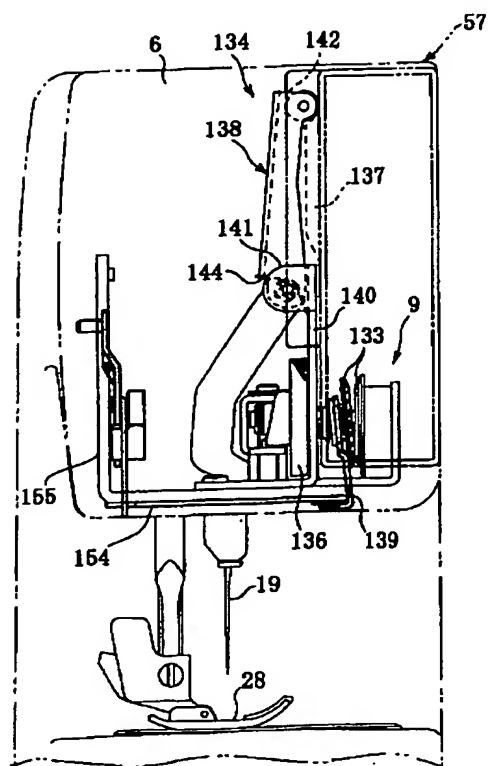
[Drawing 31]



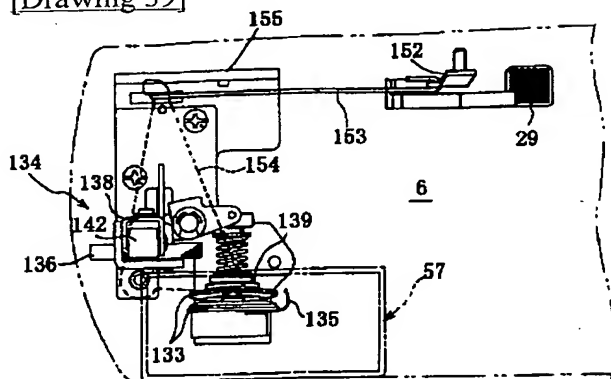
[Drawing 33]



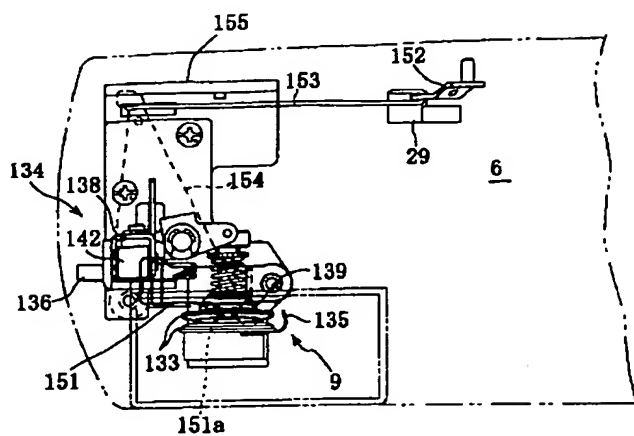
[Drawing 38]



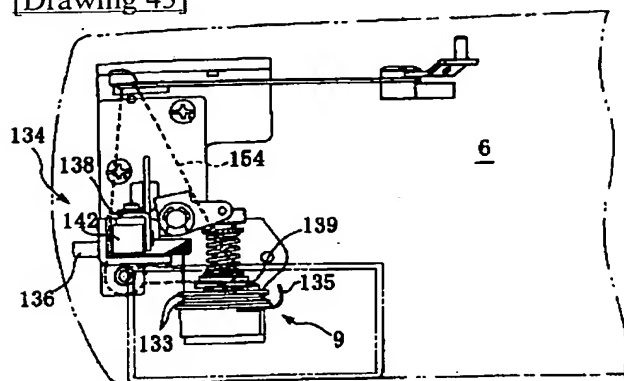
[Drawing 39]



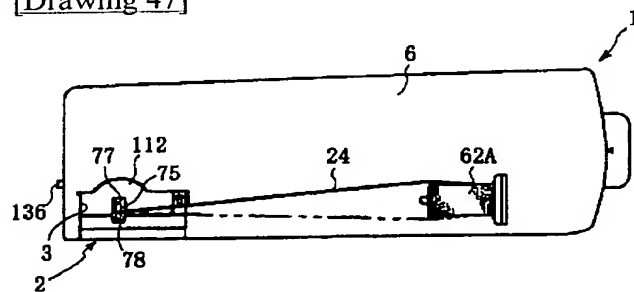
[Drawing 35]



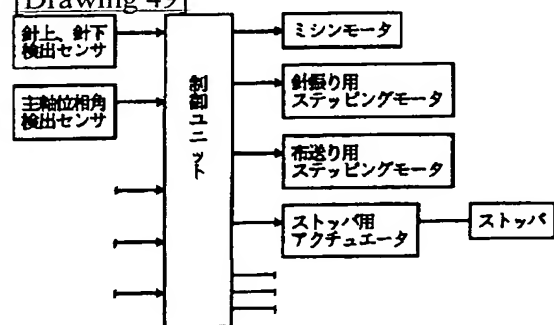
[Drawing 43]



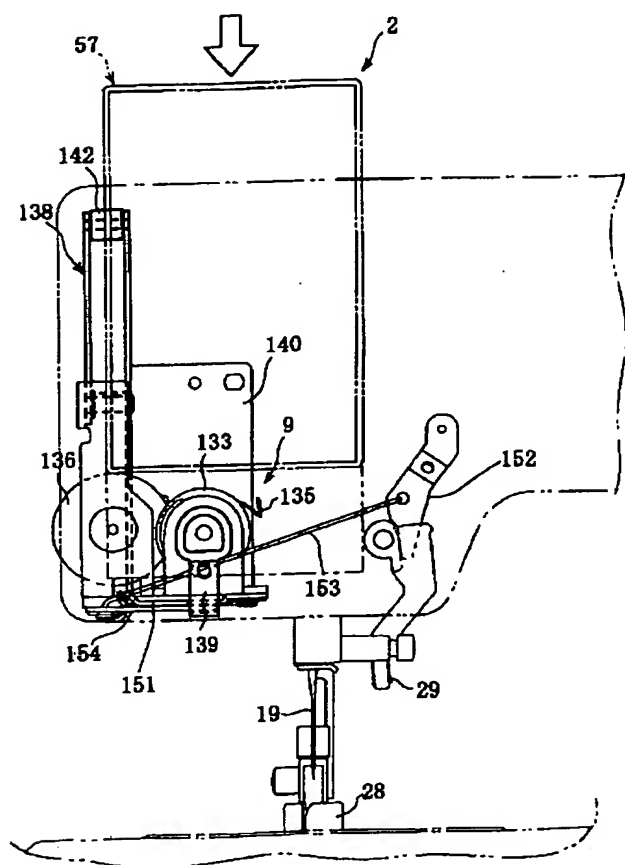
[Drawing 47]



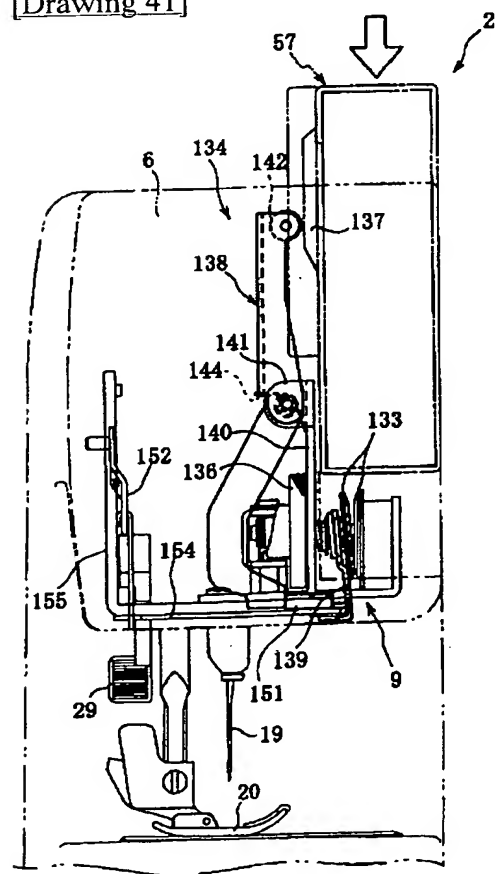
[Drawing 49]



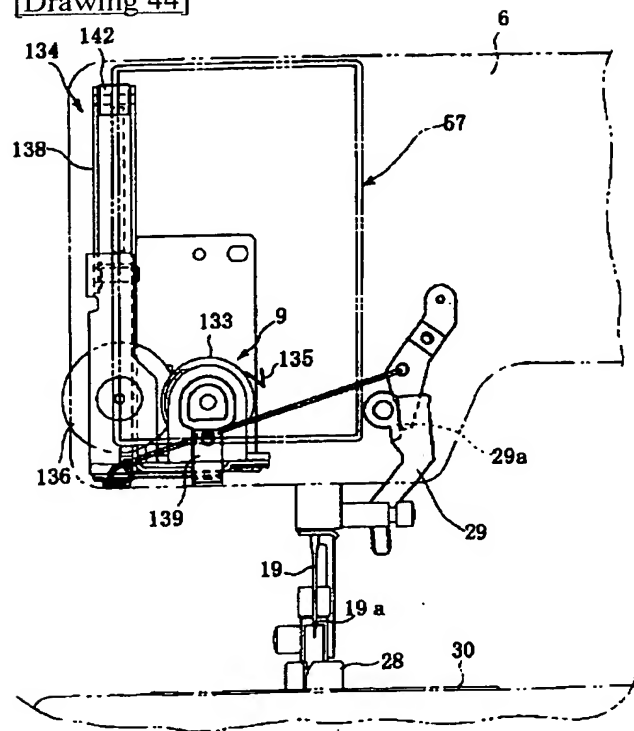
[Drawing 40]



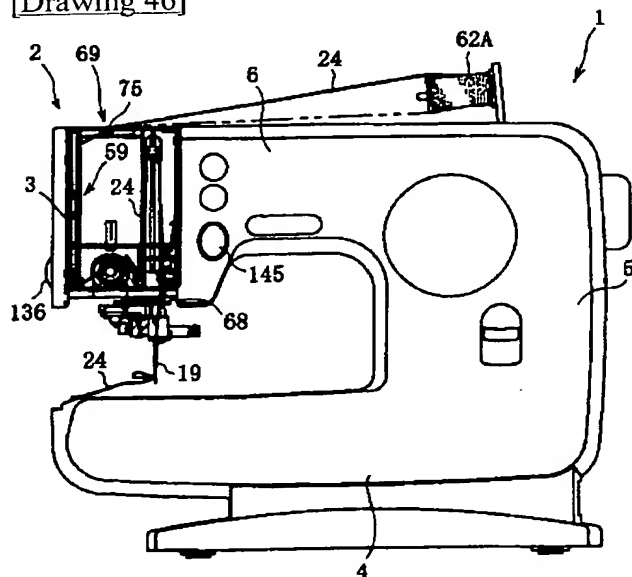
[Drawing 41]



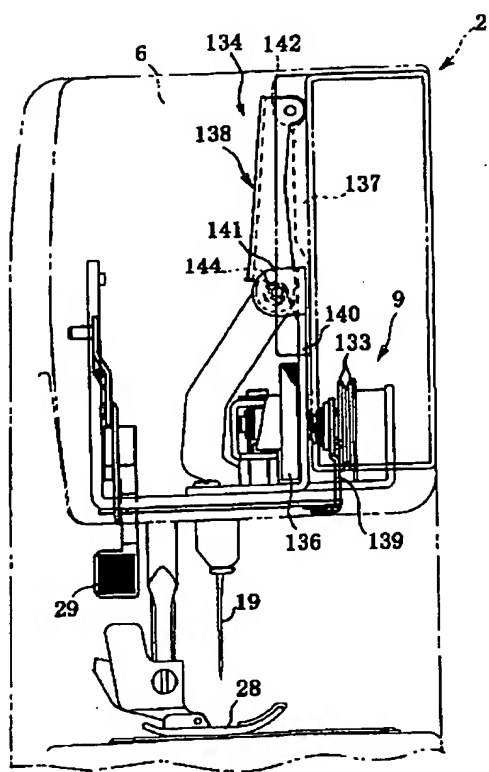
[Drawing 44]



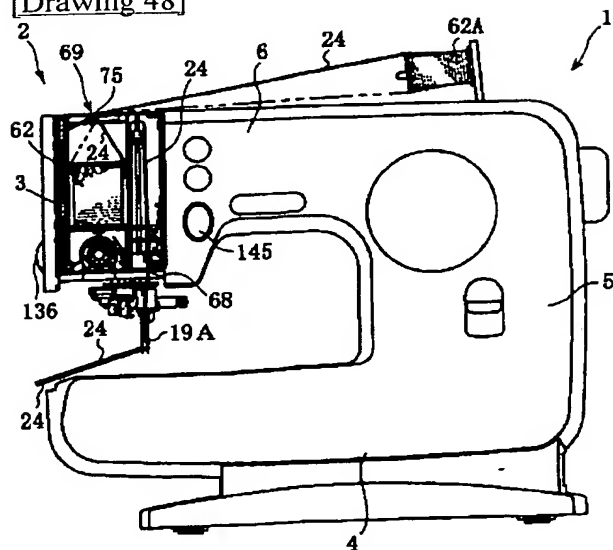
[Drawing 46]



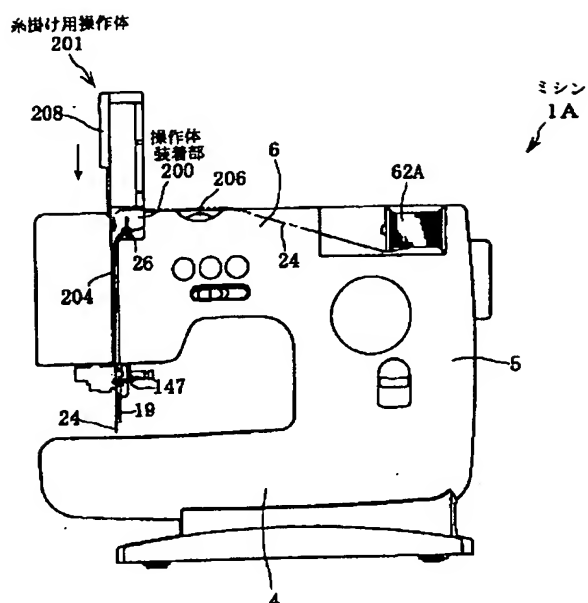
[Drawing 45]



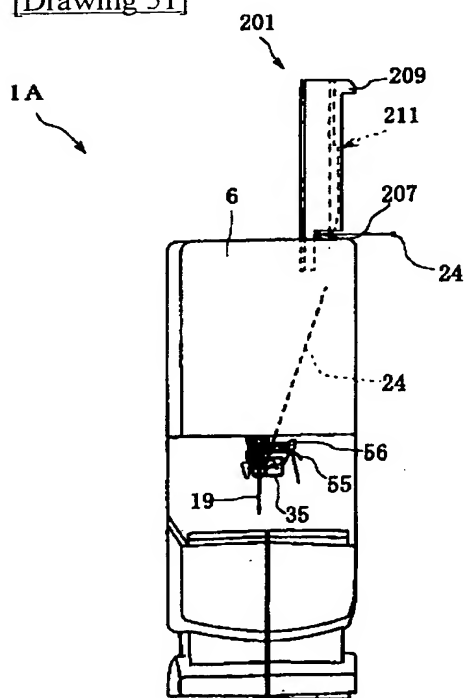
[Drawing 48]



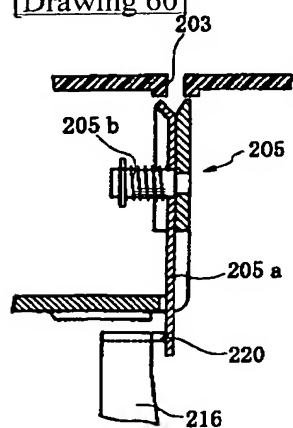
[Drawing 50]



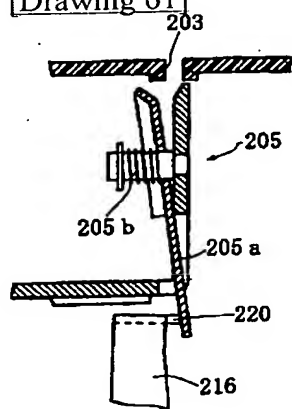
[Drawing 51]



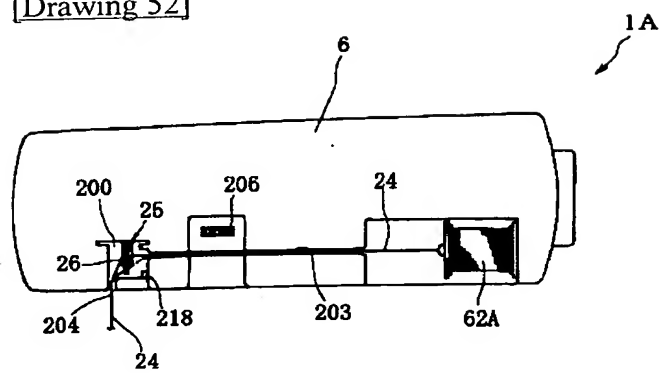
[Drawing 60]



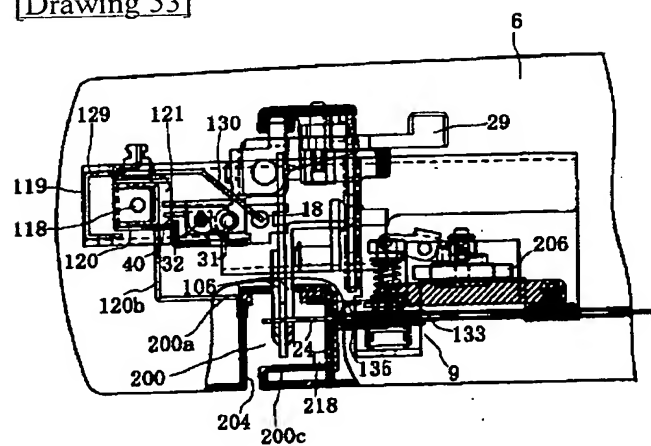
[Drawing 61]



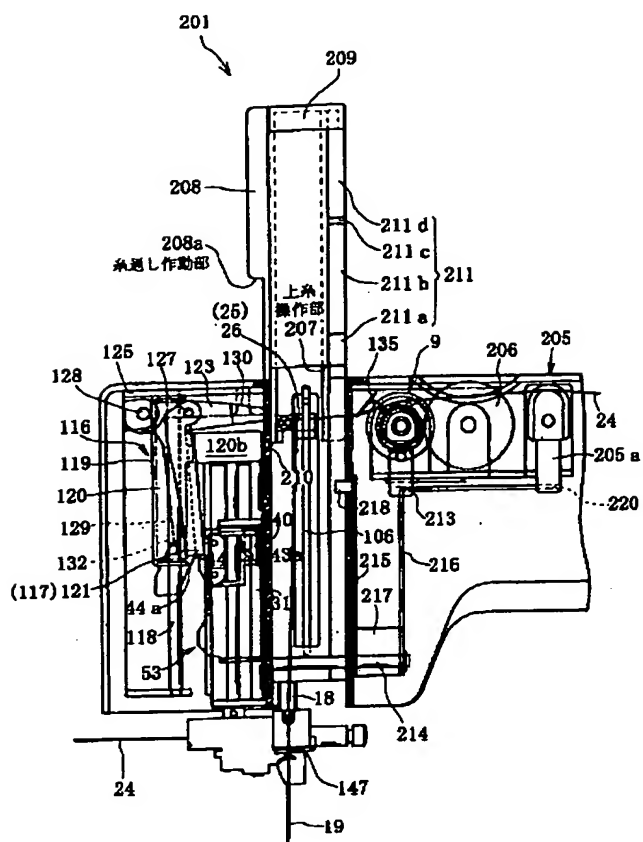
[Drawing 52]



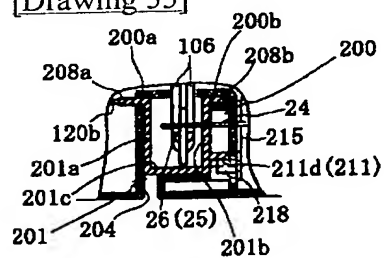
[Drawing 53]



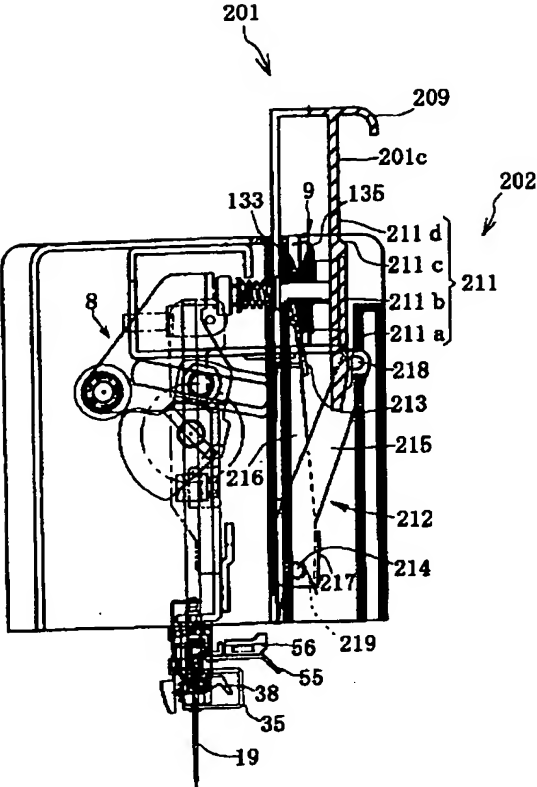
[Drawing 54]



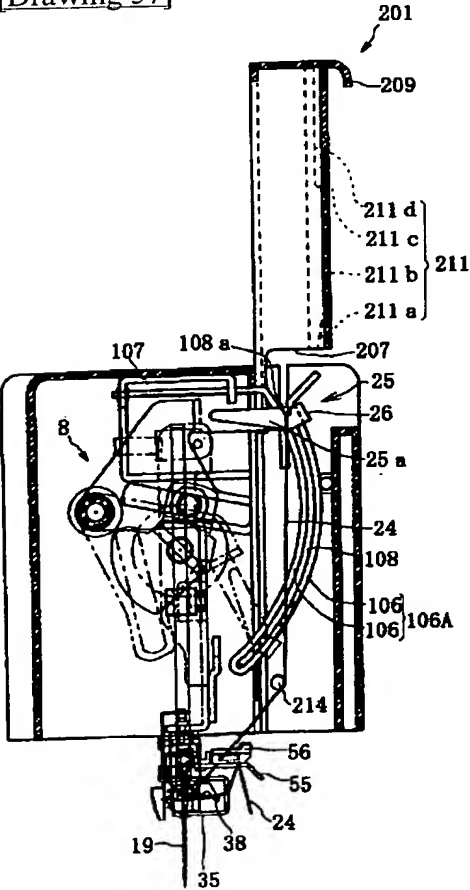
[Drawing 55]



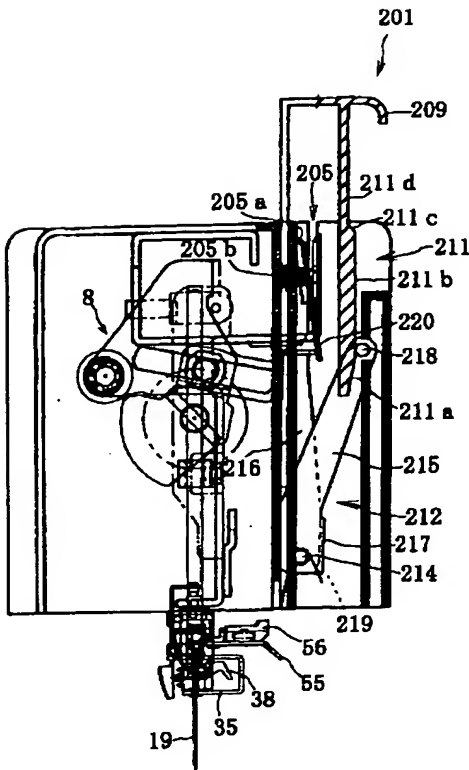
[Drawing 58]



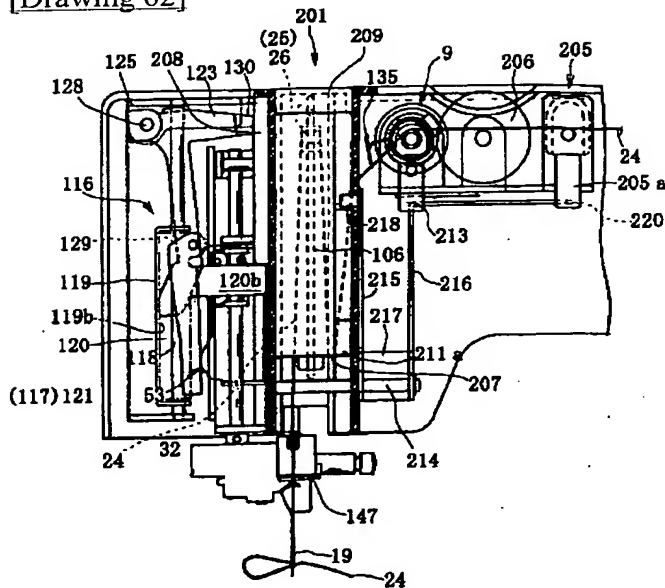
[Drawing 57]



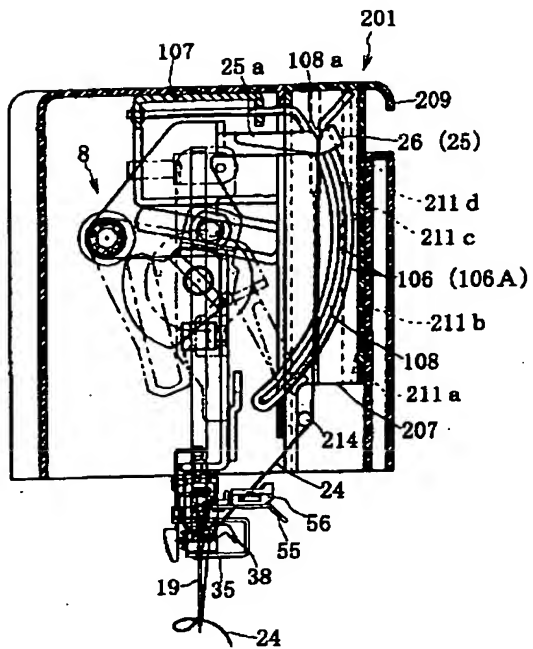
[Drawing 59]



[Drawing 62]



[Drawing 63]



[Translation done.]



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.CI.7)
D, A	<p>PATENT ABSTRACTS OF JAPAN vol. 2002, no. 11, 6 November 2002 (2002-11-06) -& JP 2002 191886 A (BROTHER IND LTD), 10 July 2002 (2002-07-10) * abstract; figures * -----</p>	1, 6-8	D05B43/00 D05B47/00
			TECHNICAL FIELDS SEARCHED (Int.CI.7)
			D05B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		1 April 2005	Debard, M
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 03 02 0608

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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01-04-2005

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		EP 1354995 A1	22-10-2003
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		US 2004099190 A1	27-05-2004
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